Beech Ridge Wind Energy Project
Habitat Conservation Plan
Greenbrier and Nicholas Counties, West Virginia

By

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May 2012

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1.0 INTRODUCTION

1.1 Overview and Background

Beech Ridge Energy LLC (BRE), a wholly owned subsidiary of Invenergy LLC, owns and operates the Beech Ridge Wind Energy Project (Project). The Project is located in Greenbrier and Nicholas counties, West Virginia (Figure 1.1), approximately 5 miles (8 km) northwest of the town of Trout, approximately 7 miles (11 km) north-northwest of Williamsburg, and approximately 9 miles (14 km) northeast of downtown Rupert, West Virginia.

The Project consists of several primary components, including wind turbines, access roads, transmission and communication equipment, storage areas, and control facilities. Sixty-seven wind turbines have been constructed and are operational. BRE proposes to construct and operate up to additional 33 turbines.

The Project is located on a 63,000-acre tract owned by MeadWestvaco. BRE has leased approximately 6,860 acres and additional road rights-of-way from this landowner. Only a small portion of the 6,860-acre Project area will host wind farm facilities. It is anticipated that the area of direct land use for the 100 turbines, access roads, substation, and the operations and maintenance (O&M) facility will be approximately 71 acres. BRE has acquired the necessary land rights to construct and operate the existing 67-turbine portion of the Project and its associated facilities from MeadWestvaco. BRE has acquired the necessary land rights to develop and permit the 33 expansion turbines from MeadWestvaco and is in the process of obtaining the necessary land rights to construct and operate these 33 expansion turbines.

In August 2006, the West Virginia Public Service Commission (WVPSC) granted BRE a siting certificate to construct the Project. The Project as initially approved included up to 124 1.5-megawatt (MW) turbines totaling 186 MW of total nameplate generating capacity. The Project has since been scaled back in the context of settlement negotiations and is now limited to 100 turbines totaling up to 186 MW of generating capacity. Initial construction began in April 2009, and the Project first began commercial operation in March of 2010. The project will be developed in two phases—a 67-turbine phase (already constructed) and an up to 33-turbine phase to be constructed after issuance of the Incidental Take Permit (ITP).

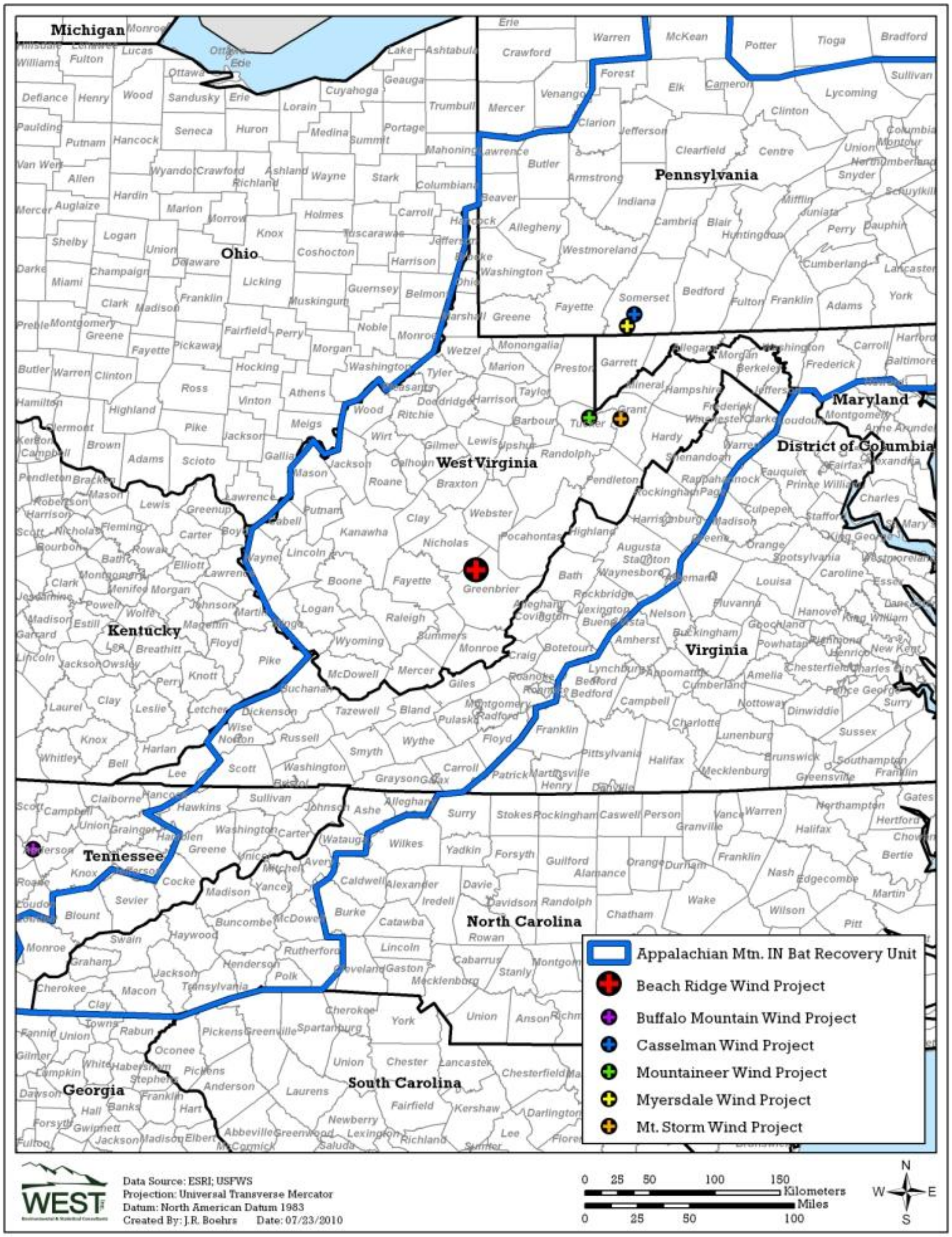

Figure 1.1 Beech Ridge Energy Wind Project Location.

BRE is now applying for an ITP for the Project, pursuant to Section 10(a)(1)(B) of the *Endangered Species Act of 1973* (ESA), as amended (16 *United States Code* [U.S.C.] 1531 et seq). BRE is applying for this ITP as part of a settlement agreement concerning the effects of the Project on the ESA-listed Indiana bat (*Myotis sodalis*).[1] Under the terms of this settlement agreement, BRE has agreed to limit the operation of Project wind turbines that are already constructed and to forego construction and operation of new Project turbines pending receipt of an ITP from the U.S. Fish and Wildlife Service (USFWS) (see Sections 2.0 and 2.1.4 below).[2]

1.2 Regulatory Framework

The following is a summary of applicable laws and regulations governing the project.

1.2.1 Federal

1.2.1.1 *Endangered Species Act*

Section 9 of the ESA prohibits the "take" of any endangered or threatened species of fish or wildlife listed under the ESA. Under the ESA, the term "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect species listed as endangered or threatened or to attempt to engage in any such conduct. Under Section 10 of the ESA, the USFWS may authorize, under certain terms and conditions, any taking otherwise prohibited by Section 9(a)(1)(B) if such taking is incidental to, and not the purpose of, an otherwise lawful activity. This Section 10 take authorization is known as an ITP.

Harass in the definition of "take" in the ESA means an intentional or negligent act or omission that creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns that include, but are not limited to, breeding, feeding, or sheltering. Harm in the definition of take in the ESA means an act that actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.

To qualify for an ITP, a non-federal landowner or land manager must develop, fund, and implement a USFWS-approved Habitat Conservation Plan (HCP). The HCP must specify the following information described in ESA Section 10(a)(2)(A) and 50 *Code of Federal Regulations* (C.F.R.) 17.22(b)(1) and 50 C.F.R. 17.32(b)(1):

- The impact that will likely result from such taking;

[1] *See Animal Welfare Institute et al. v. Beech Ridge Energy LLC*, Case No.: RWT 09cv1519 (D. MA January 20, 2010) (Stipulation) and *Animal Welfare Institute v. Beech Ridge Energy, LLC*, Case No. 8:09-cv-01519-RWT, Order Granting Joint Motion for Approval of Modification of Stipulation, Dkt. No. 98 [D. Md. Feb. 16, 2012].)(Modification). The Stipulation and Modification discuss in detail the agreed construction and operational regime currently implemented as a part of the baseline environmental conditions.

[2] On June 30, 2011, BRE filed an application for an ITP with USFWS for the Project. Thereafter, USFWS provided comments in response to the application. This version of the HCP has been revised to address comments provided by USFWS on the June 30, 2011, version of the HCP.

- The measures the applicant will undertake to monitor, minimize, and mitigate such impacts, the funding that will be available to implement such measures, and the procedures to be used to deal with unforeseen circumstances;
- The alternative actions the applicant considered that would not result in take and the reasons why such alternatives are not proposed to be utilized; and
- Such other measures that the Director of the USFWS may require as necessary or appropriate for purposes of the HCP.

The USFWS will issue an ITP if it finds that the following criteria of ESA Section 10(a)(1)(B) and 50 C.F.R. 17.22(b)(2) and 50 C.F.R. 17.32(b)(2) are met:

- The taking will be incidental to otherwise lawful activities;
- The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such takings;
- The applicant will ensure that adequate funding for the HCP and procedures to deal with unforeseen circumstances will be provided;
- The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild;
- The applicant has met the measures, if any, required by the Director of the USFWS as being necessary or appropriate for the purposes of the plan; and
- The Director of the USFWS has received such other assurances, as he or she may require, that the plan will be implemented.

1.2.1.2 *National Environmental Policy Act*

Issuance of an ITP is a federal action subject to compliance with the *National Environmental Policy Act* (NEPA) (42 U.S.C. 4321 et seq.) and Council on Environmental Quality regulations implementing NEPA (40 C.F.R. 1500 – 15081). To comply with NEPA, before issuing an ITP, the USFWS must take a “hard look” at the effects of issuing the permit on the human environment. The USFWS has determined that preparation of an Environmental Impact Statement (EIS) will satisfy the USFWS’s obligation under NEPA to determine the significance of environmental impacts associated with the federal action. The EIS involves a detailed evaluation of the effects of the federal action on the human environment and includes analysis of a reasonable range of alternatives to the federal action (in this case, issuance of an ITP requiring implementation of an HCP and any other permit terms and conditions). Upon completion, the Draft EIS will be made available for public review along with this HCP.

Through the scoping process, the USFWS solicited input from other federal, state, and local agencies, as well as from other interested parties (e.g., general public, non-governmental organizations [NGOs]) regarding the scope of the EIS and the range of reasonable alternatives.

Public and Agency Outreach and Notification. The USFWS used several media to notify the public and potentially interested parties to provide them with the opportunity to participate in the scoping process.

Federal Register – Notice of Intent. The USFWS’s formal scoping process began on July 22, 2010, with the publication in the Federal Register of a *Notice of Intent for Preparation of an*

Environmental Impact Statement for Issuance of an Incidental Take Permit and Associated Habitat Conservation Plan for the Beech Ridge Wind Energy Project, Greenbrier and Nicholas Counties, WV (Federal Register, Vol. 75, No. 140 [July 22, 2010/Notices]).

The notice provided information about:

- The Project and the EIS;
- Species proposed for inclusion in the BRE HCP; and
- The specific location, date, and time of the public scoping meeting; how comments could be mailed, faxed, or e-mailed to the USFWS until August 23, 2010; and contact information for the key USFWS representative to request further information from (their name, address, and telephone number).

The USFWS received requests from 15 interested parties to extend the comment period. An additional Federal Register notice was published on August 27, 2010, to notify the public of the USFWS's intent to reopen and extend the scoping comment period until September 23, 2010 (*Preparation of an Environmental Impact Statement for Issuance of an Incidental Take Permit Associated With a Habitat Conservation Plan for the Beech Ridge Wind Energy Project, Greenbrier and Nicholas Counties, West Virginia; Re-opening and Extension of Comment Period;* Federal Register, Vol. 75, No. 166 [August 27, 2010/Notices]).

Persons needing reasonable accommodations in order to attend and participate in the scoping meeting were asked to contact the USFWS a minimum of one week in advance of the meeting such that appropriate arrangements could be made. The USFWS received no requests for reasonable accommodations.

<u>Press Releases for Scoping and Public Meeting</u>. Press releases announcing the scoping periods and open house/public scoping meeting were issued to multiple media outlets one to two weeks prior to the publication of the Federal Register notices and the public scoping meeting

- *Charleston Gazette* (Charleston, WV);
- *Charleston Daily Mail* (published in Charleston, WV, and distributed statewide);
- *West Virginia Daily News* (Lewisburg, WV);
- *Nicholas County Chronicle* (Summersville, WV);
- *Beckley Register-Herald* (Beckley, WV);
- *Bluefield Daily Telegraph* (Bluefield, WV);
- *Exponent Telegram* (Clarksburg, WV);
- *The Inter-Mountain* (Elkins, WV);
- *Times West Virginia*;
- *Herald Dispatch*;
- *West Virginia Daily News* (online newspaper);
- *The Dominion Post* (Morgantown);
- *Parkersburg News and Sentinel* (Parkersburg, WV);
- *Point Pleasant Register* (Point Pleasant, WV);
- West Virginia Public Broadcasting (Charleston, WV); and
- Associated Press (Charleston, WV).

The announcements were picked up by the Associated Press, National Public Radio, multiple newspapers, business groups, and several NGOs that distributed the announcements throughout the region in press media and television news media and via the internet. A reporter from local television channel 59 (WVNS-TV) attended and filmed portions of the public meeting, including presentations and the comment, question, and answer session.

Known Interested Party Scoping Letter. On July 26, 2010, a public scoping/*Dear Interested Party* letter was sent to 32 known interested parties. The letter provided information on the project and the EIS and included the date, time, and location of the scoping meeting with copies of the Federal Register notice. On August 27, 2010, an additional *Dear Interested Party* letter went out to the same parties to notify them of the extended scoping comment period.

Website. To support distribution of the Notice of Intent (NOI) and notice of the public meeting, these documents and meeting information were posted on the USFWS's Region 5 (West Virginia Field Office) website at the following link:

http://www.fws.gov/westvirginiafieldoffice/beech_ridge_wind_power.html

This site is also used to facilitate public knowledge and participation through the dissemination of information regarding the Project's status, history, and planned future activities.

1.2.1.3 *Migratory Bird Treaty Act*

Among other things, the *Migratory Bird Treaty Act* (MBTA) (16 U.S.C. 703-712) prohibits the taking, killing, injuring, or capture of listed migratory birds, including their nests, eggs, and parts. The unauthorized taking of even one bird is legally considered a "take" under the MBTA and is a violation of the law. Neither the MBTA nor its implementing regulations found in 50 C.F.R. Part 21 provide for the permitting of "incidental take" of migratory birds that may be killed or injured by wind turbines.

To avoid and minimize impacts to MBTA-listed species, BRE has drafted an Avian Protection Plan (APP) that incorporates applicable measures based in part on USFWS *Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines* (USFWS 2003) and the Wind Turbine Guidelines Advisory Committee (WTGAC) recommendations to the Secretary of the Department of Interior (WTGAC 2010). The Secretary has not yet decided whether or to what degree it is adopting any of these recommendations, although the Department of the Interior recently published and is addressing public comment on the wind turbine guidelines, based in part on the WTGAC recommendations. Collectively, these recommendations contain materials to assist in evaluating possible wind power sites, wind turbine design and location, pre- and post-construction research to identify and/or assess potential impacts to wildlife, and potential minimization and mitigation measures. BRE submitted the draft APP to USFWS for its consideration and review. The USFWS Draft EIS will analyze migratory bird impacts, including the contributions of conservation measures that appear in BRE's draft APP.

1.2.1.4 *Bald and Golden Eagle Protection Act*

The *Bald and Golden Eagle Protection Act* (BGEPA) (16 U.S.C. 668-668d) prohibits the take of bald and golden eagles unless pursuant to regulations. BGEPA defines the take of an eagle to include a broad range of actions, including to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb. The term "disturb" is defined in regulations found at 50 C.F.R. 22.3 to include to agitate or bother a bald or golden eagle to a degree that it causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior.

The USFWS published a final rule (Eagle Permit Rule) on September 11, 2009, under the BGEPA (50 C.F.R. 22.26) authorizing limited issuance of permits to take bald eagles and golden eagles. A permit would authorize the take of bald eagles and golden eagles where the take is compatible with the preservation of the bald eagle and the golden eagle, necessary to protect an interest in a particular locality, associated with but not the purpose of the activity, and

1) for individual incidences of take—the take cannot be practicably avoided and
2) for programmatic take—the take is unavoidable even though advanced conservation practices are being implemented.

The USFWS recently published and is addressing public comment on the Draft Eagle Conservation Plan Guidance, which explains the USFWS's approach to issuing permits to individual companies or broad, industry-wide permits for ongoing take of eagles and provides guidance to permit applicants (project proponents). The final rule notes that wind power is an industry sector for which programmatic permits are appropriate.

Bald and golden eagles may be included as covered species in HCPs; however, if they are included, the avoidance, minimization, and other mitigation measures in the HCP must meet the BGEPA permit issuance criteria of 50 C.F.R. 22.26 and include flexibility for adaptive management. BRE's draft APP explains the biological reasoning behind its conclusion that potential to take a bald or golden eagle at the site is low to none (BRE 2011), and thus, eagles are not included as covered species in this HCP. As with migratory birds, the USFWS Draft EIS will analyze impacts of the proposed action on bald and golden eagles.

1.2.1.5 *National Historic Preservation Act*

USFWS's issuance of an ITP under ESA Section 10(a)(1)(B) is considered an "undertaking" as defined by regulation and must comply with Section 106 of the *National Historic Preservation Act* (NHPA) (36 C.F.R. 800). Section 106 requires USFWS to assess and determine the potential effects on historic properties that would result from the proposed undertaking. When an adverse effect to a historic property cannot be avoided, the USFWS must consult with State Historic Preservation Office (SHPO), the Tribal Historic Preservation Office, and other interested parties to identify ways to mitigate the effects of the undertaking. This process usually results in the development of a Memorandum of Agreement (MOA), which identifies the steps the agency will take to reduce, avoid, or mitigate the adverse effect. The MOA will be submitted to the

Advisory Council on Historic Preservation (ACHP) for review and comment. The USFWS must document NHPA compliance and include such documentation in the administrative record for the HCP. Details on the consultation process for resolution of adverse effects are found at 36 C.F.R. 800.6.

BRE entered into an MOA with SHPO for the 67-turbine phase of the Project in 2008 (Appendix G). BRE initiated the SHPO consultation process on the 33-turbine expansion in October 2010. This consultation will result in the preparation and implementation of an MOA prior to construction of the 33-turbine phase, similar to the MOA developed for the first 67-turbine phase. BRE will implement and complete all necessary archaeological field studies and implement avoidance measures prior to construction of the 33-turbine phase. All impacts to cultural resources will be avoided or mitigated in compliance with the terms of the MOA. Details concerning NHPA compliance are provided in Section 2.1.4.4 below. Copies of information developed regarding archaeological surveys will be provided to the USFWS so that the appropriate decision can be made regarding the need for supplemental NEPA analysis.

1.2.2 State

1.2.2.1 West Virginia Public Service Commission Energy Facility Siting Process

The WVPSC regulates the siting of wind energy projects in the state. The WVPSC siting approval process entails consideration of the environmental impacts of the proposed development, including impacts to birds, bats, and cultural resources. At the conclusion of the siting process, WVPSC may issue a siting certificate containing conditions that must be implemented as a part of project construction and operation.

The siting certificate for the Project was granted by WVPSC to BRE in August 2006[3] and includes a number of conservation measures that BRE must implement prior to, and after, Project construction. While not part of this HCP, the terms of the siting certificate are incorporated into the proposed Project will be implemented by BRE (Sections 2.0 and 2.1.4). Additional conservation measures have been developed by BRE in consultation with the USFWS during preparation of this HCP and are presented in Section 5.0 below.

As a part of its siting certificate, BRE is required to consult with a Technical Advisory Committee (TAC) whose membership is open to the WVPSC, USFWS, West Virginia Department of Natural Resources (WVDNR), the Bat and Wind Energy Cooperative (BWEC), a statewide environmental organization, a statewide bird group, and a private or academic institution with experience in avian issues. The siting certificate requires BRE to consult with the TAC regarding, among other things, three years of post-construction bat mortality and adaptive management studies after operations commence. To maintain an independent regulatory enforcement role, the USFWS has chosen not to participate in the Project TAC.

In addition to formation of the TAC, BRE is required to file with the WVPSC: (1) a verified statement indicating that all pre-construction conditions and requirements of the certificate have

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[3] *See Beech Ridge Energy LLC*, No. 05-1590-E-CS, 2006 W. Va. PUC LEXIS 2624, at *178-187 (W. Va. Pub. Serv. Comm'n Aug. 28, 2006).

been met and (2) evidence of any necessary environmental permits or certifications, including letters from USFWS, WVDNR, SHPO, and West Virginia Division of Culture and History (WVDCH) outlining what action BRE needs to take to be in compliance with applicable requirements. In addition, in 2009 BRE filed with the WVPSC written evidence of the completed and approved wetlands surveys for the 67-turbine phase. BRE will file an ITP and related documents with the WVPSC upon issuance.

The construction and operation of the 33-turbine phase will require additional approval from the WVPSC, in the form of a certificate amendment. To meet the requirements to obtain a siting certificate and to adequately characterize the 33-turbine expansion area, BRE has completed surveys and provided data to the USFWS relating to wetlands and streams (Potesta and Associates, Inc. 2005a, 2005b, 2010) and bat use of the area (Young and Gruver 2011). A summary of bat use survey results are presented in Sections 3.2.1.8 and 3.2.2.8. Within the expansion area, as required by the WVPSC, BRE has completed a pre-construction a spring avian migration study and avian and bat risk assessments (Young et al. 2011). BRE has also completed a literature, database, and field analysis, including a viewshed analysis, for architectural resources (Saratoga Associates, Inc. 2011) within 5 miles (8 km) of the expansion area as required by the WVPSC.

1.3 Permit Term

The proposed term of the ITP is 25 years, which allows for approximately 2 years of design and construction of up to 33 additional turbines in the expansion area (bringing the total number of turbines from the existing 67 to a full 100-turbine facility), a 20-year minimum functional life of turbines following completion of construction, and potential extended operations and/or decommissioning of the Project (up to 3 years). Prior to expiration of the ITP term, BRE will determine whether to decommission or continue operating the Project. At that time, BRE will evaluate in consultation with the USFWS the need to apply for a permit extension or renewal to continue operating the Project.

1.4 Covered Lands

BRE proposes that the ITP apply to all those lands leased by BRE for construction and operation of the Project (Covered Lands) (Figure 1.2 and Appendix A). These lands include the locations for all turbines that have been constructed (67 turbines) or will be constructed (additional 33 turbines), plus all associated facilities such as roads, collection lines, the O&M facility, meteorological towers, and the transmission line under the WVPSC siting regulations. The total area leased by BRE for the existing 67 turbines is 3,688 acres and for the additional 33 turbines is 3,172 acres, all of which is private land managed primarily for coal and timber production in Greenbrier and Nicholas counties, West Virginia.

1.5 Covered Species

BRE is applying for an ITP for Indiana bat and Virginia big-eared bat (*Corynorhinus townsendii virginianus*) for the covered activities. Both species are currently listed as endangered under the

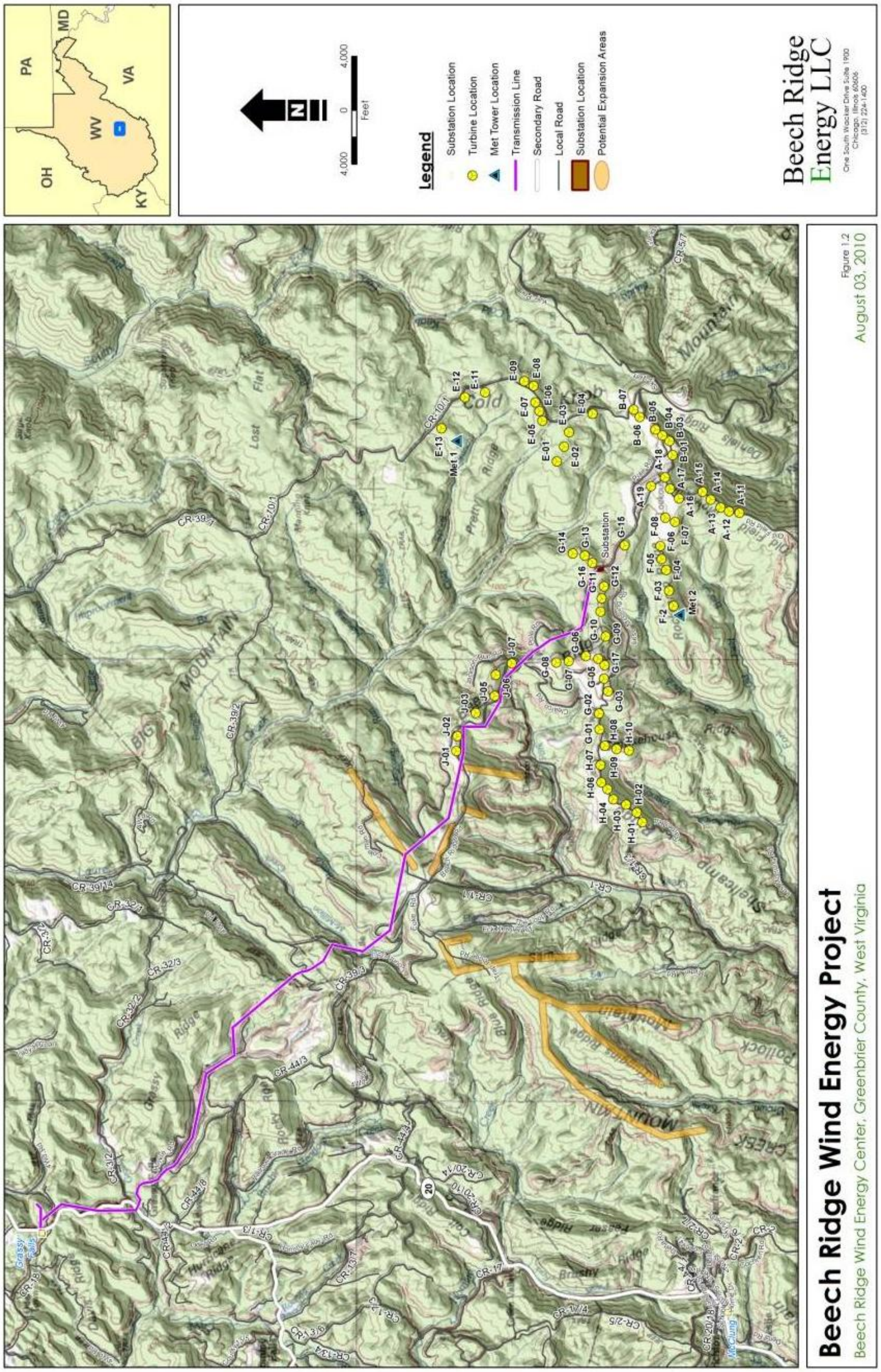

Figure 1.2 Beech Ridge Wind Energy Project.

ESA (USFWS 2010a). No other listed or candidate species are known to occur on the Covered Lands.[4]

Populations of cave-dwelling bats in the eastern and central U.S. are currently declining due to White Nose Syndrome (WNS). The USFWS has been petitioned by the Center for Biological Diversity to list northern myotis (northern long-eared myotis) (*Myotis septentrionalis*) and the eastern small-footed myotis (*Myotis leibii*) as threatened or endangered. Also, Dr. Thomas Kunz of the Boston University Center for Ecology and Conservation Biology filed a formal request for a status assessment of little brown bat (*Myotis lucifugus*).

All three of these species have been documented through mist-netting as occurring in the Project area. If one or more of these species become listed prior to issuance of the ITP, BRE may seek to include such newly listed species as covered species in the HCP. If any of these species become listed during the permit term, BRE may do so by formally amending the ITP following the process outlined in Section 8.4 of the HCP. To facilitate either scenario, BRE also has included information on the biology and current status of these species in Appendix B of this HCP.

[4] USFWS formally concurred with BRE findings that the Project was not likely to adversely affect the West Virginia northern flying squirrel (*Glaucomys sabrinus fuscus*) because the species was unlikely to occur in the Project area. Letter to: Russ Romme, BHE Environmental, Inc., Columbus, Ohio. March 7, 2006. From: Thomas R. Chapman, Field Supervisor, USWFS West Virginia Field Office.

2.0 PROJECT DESCRIPTION AND COVERED ACTIVITIES

The Project consists of two phases:

- 67-Turbine Phase: Sixty-seven turbines were constructed in 2009 and 2010. In 2010 and 2011, these 67 turbines were operated 24 hours per day from November 16 through March 31 and from one-quarter hour after sunrise to one-half hour before sunset (daylight hours) from April 1 through November 15 (non-winter months). This operational protocol was developed prior to the development of this HCP as a part of the aforementioned litigation.[5] From April 1, 2012 through November 15, 2012, these 67 turbines will be operated 24 hours per day; however, from one-half hour before sunset to one-quarter hour after sunrise (nighttime hours) only when wind speeds exceed 15.2 mph (6.9 m/s). This interim strategy was designed in consultation with the FWS. The Service believes that there is an unlikely risk of take during the short period during which BRE implements this operational strategy prior to issuance of the ITP.[6] Upon issuance of the ITP, these 67 turbines would be operated in accordance with the terms of the ITP.
- 33-Turbine Phase: Thirty-three turbines would be constructed and operated in accordance with the terms of the ITP. Construction would likely be completed within two years after ITP issuance, and commercial operation would be expected to commence upon completion of construction.

The project description presented below describes the design, construction, operation, and decommissioning of both the 67-turbine phase and the 33-turbine phase.

2.1 Project Description

During the initial phase of Project construction, 67 wind turbines were constructed and entered into commercial operation. In 2010 and 2011, these 67 turbines operated during restricted hours in non-winter months: from April 1 through November 15, they operated only during daylight hours (i.e., from one-quarter hour after sunrise to one-half hour before sunset). In 2012, these 67 turbines will operate 24 hours per day, but only when wind speeds exceed 15.2 mph (6.9 m/s) during nighttime hours. In the event take is detected, BRE will discontinue nighttime operations during the period from April 1 to November 15 until the final ITP is issued. During winter months (November 16 through March 31), when bats typically hibernate, the 67 turbines operate 24 hours per day. Forty turbines of this initial phase were constructed and operating by April 1, 2010. An additional 27 turbines were constructed in 2010 and were operational by August 15, 2010.

Under the proposed HCP, during non-winter months, these 67 existing turbines would continue to be operated during daylight hours and would operate in accordance with approved operational

[5] *See Animal Welfare Institute et al. v. Beech Ridge Energy LLC*, Case No.: RWT 09cv1519 (D. MA January 20, 2010) (Stipulation). The Stipulation discusses in detail the agreed construction and operational regime currently implemented as a part of the baseline environmental conditions.

[6] Letter dated January 30, 2012, from Paul Phifer, Assistant Director for Ecological Services, Northeast Region, to David Groberg, Vice President of Operations, BRE. The operational strategy was approved by the court as part of the February 2012 stipulation modification *Animal Welfare Institute v. Beech Ridge Energy, LLC*, Case No. 8:09-cv-01519-RWT, Order Granting Joint Motion for Approval of Modification of Stipulation, Dkt. No. 98 [D. Md. Feb. 16, 2012].)

protocols (see Section 5.0 and Appendix C below) during nighttime hours. During winter months, the 67 turbines would continue to operate 24 hours a day.

BRE proposes to construct an additional 33 turbines after issuance of the ITP, bringing the total number of Project turbines up to 100. Under the terms of the HCP, these 33 additional turbines would operate under the same approved operational protocols as the existing 67 turbines as described in the paragraph above.

2.1.1 Project Location and General Description

The Project is located in Greenbrier and Nicholas counties, West Virginia (Figure 1.2), approximately 5 miles (8 km) northwest of the town of Trout, approximately 7 miles (11 km) north-northwest of Williamsburg, and approximately 9 miles (14 km) northeast of downtown Rupert, West Virginia.

The Project is located primarily along Beech Ridge. It is bounded on the west by Clear Creek Mountain, on the south by Old Field Mountain, on the east by Cold Knob, and on the north along County Road 10/1, just past Big Bull Hill.

The Project is located generally on a 63,000-acre tract owned by MeadWestvaco. BRE has leased approximately 3,688 acres (with 3,172 acres to be leased for the 33-turbine phase), plus additional road rights-of-way from this landowner. Only a portion of the 6,860-acre Project area would actually host wind farm facilities. The area of permanent (life of project) impacts (the land to be occupied by facilities) for the 100 turbines, access roads, transmission line, substation, permanent meteorological towers, and O&M facility is approximately 71 acres (Table 2.1). About 348 acres were temporarily disturbed for construction of the 67-turbine phase and transmission line. About 157 acres of land (including converted habitat, permanent impact, and 12 acres associated with staging area and batch plant) would be temporarily disturbed during construction of 33 additional turbines (Table 2.1).

Once construction is completed, about 460 acres that were temporarily disturbed will undergo reclamation. Upon the successful reclamation of the disturbed areas, it is expected that these areas will undergo natural succession. This process is expected to start as grass and then progress into scrub/shrub habitat. Most of the areas disturbed during construction will revert back to forest in 5 – 15 years (Trimble 1973; Lima et al. 1978). In Table 2.1, these lands are referred to as converted habitat. The 130-ft (40-m) search area around each turbine that will be maintained for the life of project as grass to help facilitate post-construction ground surveys and the 50-ft (15-m) wide permanent right-of-way for the transmission line that will be maintained in a scrub/shrub habitat are also considered converted habitat. These areas would revert back to pre-project land uses after decommissioning and could revert back to forest depending on landowner wishes.

A transmission line that connects the Project to the existing electric power grid was constructed between April 2009 and April 2010 (Figure 1.2). It extends approximately 14 miles (23 km) northwest from the Project to Allegheny Power's Grassy Falls Substation north of the community of Grassy Falls in Nicholas County, West Virginia. The transmission line permanent right-of-way occupies approximately 85 acres and is located on property owned by seven landowners, including portions of the MeadWestvaco tract referenced above. Approximately 140 acres were disturbed during the construction of the transmission line (Table 2.1).

2.1.2 Project Components

The Project consists of several primary components, including wind turbines, access roads, communications and collection system, substation and O&M facility, and transmission line. These components are discussed in more detail below.

2.1.2.1 Wind Turbines

The Project includes 67 1.5-MW GE turbines (Figure 1.2) and an additional 33 turbines (model to be determined) to be constructed after issuance of an ITP. The turbine model selected for the 33 additional turbines will be based on current turbine prices, turbine efficiency based on detailed wind reports for that specific area, and turbine availability and the ability to change the cut-in speeds. The GE 1.5-MW turbine is a three-bladed, upwind, horizontal-axis wind turbine. The turbine rotor and nacelle are mounted on top of a tubular tower. The machine employs active yaw control (designed to position the rotor to face the wind), active blade pitch control (designed to regulate turbine rotor speed), and a generator/power electronic converter system attached to a variable speed drive train designed to produce a nominal 60 hertz [Hz], 575 or 690 Volts (V) of electric power.

The GE 1.5-MW turbine has a nameplate rating of 1,500 kilowatts (kW). Each turbine is equipped with a wind speed and direction sensor that communicates to the turbine's control system when sufficient winds are present for operation. The turbine features variable-speed control and independent blade variable pitch to assure aerodynamic efficiency and that functions as an aerodynamic control system. The GE 1.5-MW turbine begins operation in wind speeds of approximately 8 miles per hour (mph) (3.5 meters per second [m/s]) and reaches its rated capacity (1.5 MW) at a wind speed of approximately 28 mph (12.5 m/s). The turbine is designed to operate in wind speeds up to approximately 56 mph (25 m/s) and can withstand sustained wind speeds of more than approximately 100 mph (45 m/s). The color of all turbines, blades, and towers used for the Project is white, and the rotation direction, as an observer faces the turbines, is clockwise.

Table 2.1 Estimated Acres of Disturbance/Habitat Conversion for the 67- and 33-turbine Phases of the Project.

	67-turbine Phase		33-turbine Phase		Total – 100 Turbines	
Category	Converted Habitat (acres)	Permanent Disturbance (acres)	Converted Habitat (acres)	Permanent Disturbance (acres)	Converted Habitat (acres)	Permanent Disturbance (acres)
Turbine assembly area/pad[1]	100	9	49	5	149	14
Existing roads to be upgraded[2]	39	--	29	--	68	--
New access roads to be constructed[3]	43	16	21	8	64	24
Staging area and batch plant[4]	0	0	0	0	0	0
Electrical and communication cable trenches[5]	8	8	3	3	11	11
Overhead Transmission Line[6]	140	11	19	2	159	13
Substation, O&M Facility and permanent meteorological towers[7]	6	6	3	3	9	9
Total	336	50	124	21	460	71

[1] Based on 150-ft (46-m) radius during construction minus a 40 x 120-ft (12 x 37-m) crane pad area plus the 20-ft (6-m) radius maintained for operational purposes.
[2]Based on increasing existing road right-of-way by an additional 40 ft (12 m) for construction purposes and restoring these areas once construction is complete.
[3]Based on creating a new access road right-of-way approximately 60 ft (18 m) wide during construction. After construction, the right-of-way is reduced to 16 ft (5 m) for operations.
[4]Staging area and batch plant constructed for 67 turbines phase covered approximately 12 acres. BRE constructed this area in an existing agricultural field and fully restored it upon completion of construction. BRE anticipates using this site is for the same purpose for Phase II. Area does not result in habitat conversion or permanent disturbance.
[5]Calculation based on having an Electrical Collection System right-of-way solely used for those portions of the communications and collection system that are not included in the road rights-of-way of approximately 4 ft (1 m) primarily located along project road rights-of-way. Two-foot (1-m) right-of-way used for permanent impact.
[6]Existing transmission line is approximately 14 miles (23 km) long, which required approximately 11.5 miles (18.5 km) of habitat disturbance due to BRE's successful efforts to locate 2.5 miles (4.0 km) of the line within reclaimed strip mine areas. Habitat found in the reclaimed strip mine areas consists of scrub/shrub and grassland. Permanent impact associated with existing transmission line is based on an 8-ft (3-m) access road for the length of the line. A supplementary 1.6-mile (2.6-km) long transmission line could be required for Phase II. Each line would have a construction right-of-way width of 100 ft (30 m) and permanent right-of-way of 50 ft (15 m).
[7]Calculations based on having 1.0 acre for the substation, 2.0 acres for O&M facility, and 1.5 acres for each permanent met tower (assumes two permanent met towers for each phase).

Each turbine includes a Supervisory Control and Data Acquisitions (SCADA) communications system that permits automatic independent operation and remote supervision, allowing continuous control of the wind farm to ensure optimal and efficient operation and early troubleshooting of problems. SCADA data provide detailed operating and performance information for each wind turbine, and BRE maintains a database tracking each wind turbine's operational history.

Other specifications of the GE 1.5-MW turbine include:

- active blade pitch power control;
- SCADA system with programmable logic controller remote control and monitoring system;
- gearbox with three-step, planetary spur gear system;
- double-fed, three-phase asynchronous generator;
- a fail-safe braking system that includes electromechanical pitch control for each blade (three self-contained systems) and a hydraulic parking brake that operates in a fail-safe mode, whereby the braking system is engaged in case of load loss on the generator;
- a redundant braking system including both aerodynamic over-speed controls (including variable pitch, tip, and other similar systems) and mechanical brakes; and
- electromechanically driven yaw system with wind direction sensor and automatic cable unwind.

Rotor, Hub, and Nacelle. The rotor consists of three blades attached to a hub. The rotor blades are constructed of fiberglass and epoxy or polyester resin. The cast iron hub connects the rotor blades to the main shaft and transmits torque. The hub is attached to the nacelle, which houses the gearbox, generator, brake, cooling system, and other electrical and mechanical systems. Figure 2.1 presents scale drawings of the GE 1.5-MW sle wind turbine used in Phase I and the maximum turbine dimensions proposed for Phase II.

The 67 GE 1.5-MW sle wind turbines use a maximum 252-ft (77-m) rotor diameter with a rotor-swept area of approximately 50,095 square ft (4,654 square m). The rotor speed is from 11.0 to 22.2 revolutions per minute (rpm), and all rotors rotate in the same direction.

The 33 additional wind turbines would use a maximum 328-ft (100-m) rotor diameter with a maximum rotor-swept area of approximately 84,454 square ft (7,875 square m). The rotor speed would be 9.75 to 16.25 rpm, and all rotors would rotate in the same direction.

Towers. The nacelles for the 67 GE 1.5-MW sle turbines are mounted on freestanding monopole tubular steel towers with a hub height of 262 ft (80 m). The total height of the 67 GE 1.5-MW sle wind turbines with a blade extending straight up is 388 ft (118 m). Each tower would consist of three sections manufactured from steel plates. All welds are made in automatically controlled power welding machines and are ultrasonically inspected during manufacturing per American National Standards Institute specifications. All surfaces are sandblasted, and multiple layers of coating are applied for protection against corrosion. Access to the turbine is through a lockable steel door at the base of the tower. The steel door at the base of each tower also includes a low voltage safety light on a motion sensor for entry.

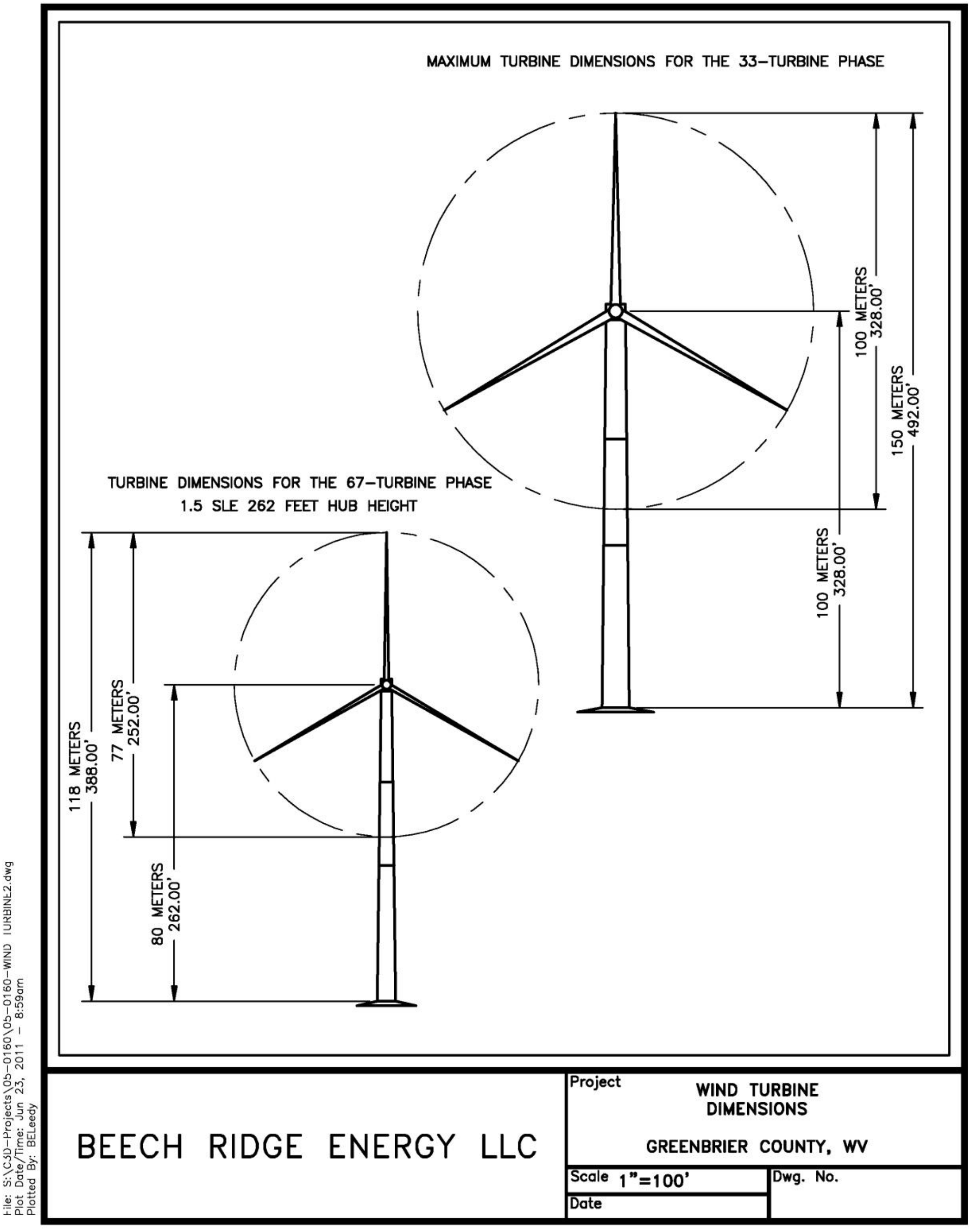

Figure 2.1 Typical 1.5- or 1.6-MW Wind Turbine.

The nacelles for the 33 additional turbines would be mounted on monopole towers with a maximum hub height of 328 ft (100 m). The maximum height of the 33 Phase II wind turbines with a blade extending straight up is 492 ft (150 m). Each tower would be made either of a steel design similar to the towers described above or with a steel lattice structure covered in architectural fabric to create a monopole tower.

Foundations. The turbine towers are connected by anchor bolts to an underground concrete and rebar foundation. Geotechnical surveys and turbine tower load specifications dictate final design parameters of the foundations. A typical spread footer has a similar footprint to the tower diameter at grade but may spread out below grade to as much as 49 x 49 ft (15 x 15 m) in size. This type of footer was used throughout the 67-turbine phase. The foundations for the 33-turbine phase will be based on geotechnical surveys and may include spread footers of deep foundations. A typical deep foundation is placed on an area approximately 25 x 25 ft (8 x 8 m) in size. All foundations consist of anchor bolts, concrete, and reinforcing rebar. Certain specific site-conditions may require subgrade modification to support the foundation.

2.1.2.2 Access Roads

The project area is accessed using existing county public roadways and privately owned timber roads plus existing upgraded or newly constructed all-weather access roads. The main access route for the Project, including equipment deliveries, is via County Road 10/1 north from Rupert to Clearco.

Approximately 16 miles (26 km) of roads utilized for the 67 turbines were either existing upgraded roads (8 miles [13 km]) or newly constructed roads (8 miles [13 km]). BRE estimates that it will need to upgrade up to 6 miles (10 km) of existing roads and potentially construct approximately 4 miles (6 km) of new roads for the 33 turbines. Where possible, BRE will utilize previously disturbed timber/mining haul roads, as well as historic timber skid trails that were utilized for previous timbering operations. Access roads are approximately 16 ft (5 m) wide during the operational phase. During construction, primary component haul roads were typically 20 ft (6 m) wide, and turbine/crane access roads were typically 60 ft (18 m) wide, providing the 35 ft (11 m) needed for movement of the large crane and additional clearance area for crane operation and drainage features. Disturbance width typically increased in steeper areas due to cuts and fills necessary to construct and stabilize roads on slopes. BRE worked with the landowners in utilizing existing roads or logging trails and in locating new access roads to minimize land use disturbance and to avoid sensitive resources and steep topography to the extent possible, while maximizing transportation efficiency.

2.1.2.3 Communications and Collection System

A control panel inside the base of each turbine tower houses communication and electronic circuitry. A step-up transformer is installed at the base of each turbine to raise the voltage from 575 or 690 V to distribution line voltage (34.5 kV). Generated electricity moves through an underground collection system to the Project substation. Both power and communication cables were or will be buried in trenches a minimum of 4 ft (1 m) deep. An estimated 32 miles (51 km) of underground collection system was installed for the 67-turbine project. Up to approximately 9 miles (15 km) of underground collection system may be installed for the additional 33 turbines.

2.1.2.4 Substation and O&M Facility

The Project 34.5-kV/138-kV substation is owned by BRE and was constructed and is operated to industry standards. The substation is similar to substations used on transmission systems in the region. The substation main transformer was installed on an 11 x 17-ft (3 x 5-m) concrete pad, and the main control building was installed on a 15 x 33-ft (5 x 10-m) concrete pad within a 1-acre parcel of land centrally located within the Project (see Figure 1.2). The substation houses transformers and other facilities to step-up medium voltage power from the collection system to high voltage for delivery to the 138-kV transmission line. The majority of the yard is covered with crushed rock. The substation is fenced with a 7-ft (2-m) high chain-link fence topped with three strands of barbed wire, for a total fence height of 8 ft (2 m). Access gates are locked at all times and warning signs posted for public safety.

The Project O&M facility is located separately from the Project 34.5/138-kV substation (see Figure 1.2). The O&M building is approximately 60 ft (18 m) wide and 102 ft (31 m) long and is constructed of concrete and located on a concrete slab. The O&M building contains all necessary plumbing and electrical collections needed for typical operation of offices and a maintenance shop.

Utilities such as electric service, water service, sewer service, telephone service, and access to a septic system are required at the site. Water is supplied locally through the use of well(s). Permits for the installation of the septic system and the well(s) have been acquired through the local health department.

2.1.2.5 Transmission Line

A 138-kV overhead transmission line associated with the Project moves power from the Project substation in a northwestern direction into Nicholas County where it ties into the existing Allegheny Power Grassy Falls Substation adjacent to West Virginia State Route 20. The Grassy Falls Substation is referred to as the Point of Interconnect and is the location where energy generated by the Project connects to Allegheny Power's existing transmission system. Conservation measures related to the transmission line are discussed in the APP (BRE 2011).

The transmission line was constructed in 2009-10 and is approximately 14 miles (23 km) long (Figure 1.2). The construction right-of-way was 100 ft (30 m) wide; the permanent right-of-way is 50 ft (15 m) wide. Where possible, BRE routed the right-of-way through previously impacted areas such as reclaimed surface mines, existing powerline rights-of-way, and property actively utilized for forest products to minimize impacts to streams, wetlands, and other natural resources. The 11.5 miles (18.5 km) of right-of-way that were not located within existing disturbed areas crossed forested habitat similar to habitat within the project area.

One hundred fifty-six transmission line poles were installed, with an average span between poles of approximately 500 ft (152 m). Transmission line poles consist of primarily single steel pole structures, secured as necessary with guy wires. Pole structures 154 and 156 are H-frame structures, and structure 155 is a three-pole structure. Pole height ranges from 61 to 88 ft (19 to 27 m). Poles were set into a drilled hole in the soil or rock and then backfilled with select stone and granular soil fill. Setting depth was 10 percent of the pole length plus 2 ft (<1 m) or deeper as specified by the design engineer. The poles support both the steel-reinforced aluminum electrical conductor line and a composite fiber optic ground wire. It is currently estimated that a supplemental transmission line could be needed for the 33-turbine phase that will connect directly to the existing transmission line. The supplemental line would be up to 1.6 miles (2.6 m) long and have the same construction and operational rights-of-way as the existing line.

2.1.2.6 Facility Life Span

The Project's minimum life span after construction is expected to be about 20 years.

2.1.3 Construction of the 33-turbine Phase

Construction of the initial 67-turbine phase, including the transmission line, substation, O&M building, and most access roads and collection and communications lines was completed in August 2010. Approximately 8 miles (13 km) of existing roads were upgraded and 8 miles (13 km) of new roads were constructed for the 67-turbine phase; approximately 6 miles (10 km) of existing roads will be upgraded and 4 miles (6 km) of new roads will be constructed for the 33-turbine phase. Habitat impacts from construction of these 67 turbines are discussed in Section 3.0, Environmental Setting/Biological Resources, below. The following section discusses the construction of the 33-turbine phase of the project.

Construction of the additional 33 turbines should be completed within 2 years of the issuance of the ITP. The duration of the on-site construction work for the 33 turbines is approximately six to nine months. Prior to construction of the additional 33 turbines, BRE will (1) order all necessary components, including wind turbine generators, foundation materials, electrical cable, and transformers; (2) complete micrositing of final turbine locations; (3) complete an American Land Title Association survey to establish locations of structures and roadways; (4) complete soil borings, testing, and analysis for proper foundation design and materials; and (5) complete all necessary archaeological field studies and avoidance measures (if any), prior to construction of the 33-turbine phase.

The 33 turbines will be constructed using standard construction procedures and equipment used for other wind farms in the eastern U.S. Construction will entail the following activities, listed in typical order of occurrence:

- road and pad construction;
- foundation excavation and pouring concrete foundations for turbine towers, meteorological towers, transformers pads;
- trenching and placement of underground collection and communications cables;
- tower erection, nacelle and rotor installation;
- testing and commissioning; and
- final road grading, erosion control, and site clean-up.

A construction staging and laydown area, including project offices, equipment, and employee parking areas, was developed on approximately 8 acres for the 67-turbine phase of the project and will be utilized during construction of the additional 33 turbines. A temporary concrete batch plant will be located adjacent to the staging area on a 4-acre area.

A well has been installed within the Project site to serve the necessary water requirements for the concrete batch plant (Table 2.2). Water utilized for dust suppression will be taken from local perennial creeks/ponds within the Project area. Portable self-contained restroom facilities will be provided and used by the contractor's personnel while on-site. These facilities will be delivered, maintained, and replaced by a third-party contractor. A septic system was installed in the O&M facility during construction of the 67-turbine phase.

2.1.3.1 Road Construction

Existing roads will be upgraded and new roads will be constructed in accordance with industry standards for wind farm roads and local building requirements. The roads will accommodate all-weather access by heavy equipment during construction and long-term use during operations and maintenance. The 4 miles (6 km) of new roads required for Phase II will be located in consultation with the landowner to minimize disturbance, maximize transportation efficiency, and avoid sensitive resources and unsuitable topography, where feasible. All new roads will be constructed for the specific purpose of Project construction, operation, and maintenance.

Roads will be designed, built, surfaced, and maintained to provide safe operating conditions at all times. The minimum travelway for access roads would be 16 ft (5 m). All roads will include road base, surface materials, appropriate drainage, and culverts. Surface disturbance will be contained within road rights-of-way, which will average 60 ft (18 m) along turbine/crane access

Table 2.2 Estimated Water Use for Construction and Decommissioning of the 33-turbine Expansion

Construction	Yards of Concrete/Turbine	Gal/ yard	Gal/ Turbine	No. Turbines	Total Gal
Turbines	299	29	8,671	33	286,143
Road dust suppression	15,000 gal/day, 20 days/month for 6 to 9 months				1,800,000 – 2,700,000
Total water used during construction					2,086,143 – 2,986,143
Decommissioning					
Road dust suppression	2500 gallon/day, 12 days/month for 2.5 months				75,000
Total Water Use					2,161,143 – 3,061,143

roads. Disturbance width may increase in rugged topography due to cuts and fills necessary to construct and stabilize roads on slopes.

Topsoil removed during road construction will be stockpiled in elongated rows within road rights-of-way. Topsoil will be re-spread on cut-and-fill slopes, and these areas will be revegetated as soon as possible after road construction is complete.

Construction of the 33-turbine phase will necessitate temporary disturbances for crane pads at each turbine site, temporary travel roads for the cranes, temporary turning areas for oversized equipment at certain county and local road intersections, temporary laydown areas around each turbine and for trenching in the underground electrical collection and communications system, and storage/stockpile areas. Construction of each turbine will include temporary impacts of approximately 44 ft (13 m) of gravel roadway on either side of the permanent roadway 60-ft (18-m) total width and a 40 x 120-ft (12 x 37-m) gravel crane pad extending from the roadway to the turbine foundation, which would be graded to a minimum of 1 percent and would fall within the 150-ft (46-m) radius rotor laydown area centered around the turbine foundation that would be graded to a maximum of 10 percent.

During construction, operation, and maintenance of the Project, traffic will be restricted to roads developed for the Project and designated existing roads. Use of unimproved roads will be restricted to emergency situations. Speed limits (25 mph) will be set to ensure safe and efficient traffic flow and to minimize the potential for animal/vehicle collisions. Signs will be placed along the roads as necessary to identify speed limits, travel restrictions, and other standard traffic control measures.

2.1.3.2 Turbine Tower, Meteorological Tower, and Transformer Foundation Construction

Turbine towers will be anchor-bolted to concrete foundations. Foundations will be excavated using a backhoe, forms installed, and concrete poured. Anchor bolts will be embedded in the concrete, and the foundations will be allowed to cure prior to tower erection.

Up to two additional permanent, guyed, meteorological towers will be erected for the 33-turbine project. Permanent meteorological towers will be 262 ft (80 m) tall and installed on 3-ft (1-m) diameter pier foundations. Foundation depth will depend on local soil conditions. Foundations will be drilled using a truck-mounted drilling rig and then filled with concrete. Transformer foundations will be constructed using standard cut-and-fill procedures and by pouring concrete in a shallow slab or using a precast structure set on appropriate depth of structural fill.

2.1.3.3 Trenching and Placement of Underground Electrical and Communications Cables

Underground electrical and communications cables will be placed in approximately 4-ft (1-m) deep trenches, primarily located along the Project access roads and within the access road disturbance area (see Table 2.1 for disturbance associated with electrical and communications cables). In some cases, trenches will run from the end of one turbine string to the end of an adjacent string to link more turbines together via the underground network. Electric collection and communications cables will be placed in the trench using trucks. Electrical cables will be installed first and the trench partially backfilled prior to placement of the communications cables. Trenches will be backfilled and the area re-vegetated concurrently with reclamation of other construction areas.

2.1.3.4 Tower Erection and Nacelle and Rotor Installation

Turbine tower assembly and erection will occur within the laydown area at each turbine site. Tower bottom sections will be lifted with a crane and bolted to the foundation, and then the middle and top sections will be lifted into place and bolted to the section below. Once the tower has been erected, the nacelle and then the rotor are hoisted into place.

2.1.3.5 Testing and Commissioning

Testing involves mechanical, electrical, and communications inspections to ensure that all systems are working properly. Performance testing will be conducted by qualified wind power technicians and will include checks of each wind turbine and the SCADA system prior to turbine commissioning. Electrical tests of the Project (i.e., turbines, transformers, and collection system) and transmission system (i.e., transmission line and substation) will be performed by qualified electricians to ensure that all electrical equipment is operational within industry and manufacturer's tolerances and installed in accordance with design specifications. All installations and inspections will be in compliance with applicable codes and standards.

2.1.3.6 Final Road Grading, Erosion Control, and Site Clean-up

Once construction of the 33-turbine phase is complete, all disturbed areas will be graded to the approximate original contour, and any remaining trash or debris will be properly disposed of off-site. Areas disturbed during construction will be stablized and reclaimed using appropriate erosion control measures, including site-specific contouring and reseeding, and designed and implemented in compliance with the Project's two approved Storm Water Pollution Prevention Plans (SWPPPs). Additional SWPPPs will be prepared for the 33-turbine phase. Areas that are disturbed around each turbine during construction will revert to the original land use after construction, except for a 20-ft (6-m) radius area around each turbine that BRE will maintain for operation and maintenance purposes and the 164-ft (50-m) radius fatality monitoring plots. Upon the completion of construction, the existing land use will be able to continue with little impact from the Project.

During final road grading, surface flows will be directed away from cut-and-fill slopes and into ditches that outlet to natural drainages. BRE has prepared and implemented SWPPPs and will prepare additional SWPPP(s) for the 33-turbine phase, as required by the West Virginia Department of Environmental Protection (WVDEP). The plans include standard sediment control devices (e.g., silt fences, straw bales, netting, soil stabilizers, check dams) to minimize soil erosion during and after construction. Waste materials will be disposed of at approved and appropriate landfills. Following construction, BRE will ensure that all unused construction materials and waste are picked up and removed from the Project area.

Contractors will provide trash barrels or dumpsters to collect all construction-related waste for proper disposal at an approved facility. No waste disposal by incineration will occur. The existing O&M building will be used to store parts and equipment needed for O&M. While BRE does not anticipate the use of any liquid chemicals within the Project area, BRE will inspect and clean up the Project area following construction to ensure that no solid (e.g., trash) or liquid (e.g., used oil, fuel, or turbine lubricating fluid) wastes were inadvertently spilled or left on-site.

Cleanup crews will patrol the construction site on a regular basis to remove litter. Final site cleanup will be performed prior to shifting responsibilities to O&M crews. O&M crews will use dumpsters on-site for daily maintenance waste.

2.1.4 Mitigation, Operations, Maintenance, and Decommissioning Activities Common to the 67- and 33-turbine phases

Throughout the following section, the term "will be" is used to describe activities that have or will be performed during operation, maintenance, and decommissioning of both the 67- and 33-turbine phases of the project, although many of these activities have already been implemented for the existing operating 67-turbine phase.

2.1.4.1 Public Access and Safety

Once BRE completes construction, it will install gates to restrict public access to all of the turbine locations. The substation and O&M building will be fenced as required for public safety, but no other fencing is proposed at this time. The public will continue to have access to portions of the Project area via public roads and private roads that are regularly open to the public.

The Federal Aviation Administration (FAA) typically requires every structure taller than 200 ft above ground level to be lighted, but in the case of wind power developments, FAA allows a strategic lighting plan that provides complete conspicuity to aviators but does not require lighting every turbine. BRE has an approved lighting plan for the 67-turbine phase and will develop a lighting plan for the 33-turbine phase to be submitted for FAA approval. Forty-six of the existing 67 turbines are equipped with FAA lighting with medium intensity dual red synchronously flashing lights for night-time use and daytime use, if needed. A similar fraction (approximately two-thirds) of the 33 expansion turbines will likely require similar FAA lighting.

Safety signing will be posted around all towers (where necessary), transformers, and other high-voltage facilities and along roads, in conformance with applicable state and federal regulations.

The following security measures have been incorporated into the Project to reduce the chance of physical and property damage, as well as personal injury, at the site.

- The towers will be placed a minimum of 3,000 ft (914 m) from non-participating residences and 450 ft (137 m) (1.1 times the total height) from public rights-of-way. These distances will minimize the danger from ice shedding off turbine blades, as well as to reduce potential impacts from noise and shadow flicker. Non-participating residences or landowners are those that have not executed any agreement with BRE to participate in the project.

- Towers will be placed a minimum of 1.1 times the total height (450 ft [137 m] for the 67 existing turbines and up to 545 ft [165 m] for the 33 expansion turbines) from public rights-of-way. These distances are considered safe to minimize the danger from ice shedding off turbine blades on the lightly traveled public roads that cross the Project area.
- Security measures will be taken during the construction and operation of the Project, including temporary (safety) and permanent fencing, gates, warning signs (including signs warning of high voltage), and locks on equipment and wind power facilities.

Turbines will sit on enclosed solid steel tubular towers or steel lattice towers covered in architectural fabric in which all electrical equipment will be located, except for the pad-mounted transformer. Access to the tower is only through a solid steel door that will be locked when not in use.

Occupational Safety. BRE prepared emergency response plans that comply with Occupational Safety and Health Administration (OSHA) regulations. All construction and operational personnel will be trained to handle emergency situations that could arise at the site.

Lightning Protection and Grounding. To protect the wind turbines from damage caused by lightning strikes and to provide grounding for electrical components of the wind turbine, an electrical grounding system will be installed at each turbine location. Parts of the grounding system are built into the wind turbine blades, nacelle, and tower. In addition, a buried grounding system will be constructed as part of the wind turbine foundation pad. Design of the buried grounding system will consider local soil electrical conductivity conditions to ensure that electricity from lightning strikes will be dissipated into the ground. The design of the grounding system will also comply with all applicable local electrical codes.

Ice Throw. Icing data collected from wind turbines in northern Europe show that the farthest an ice fragment was found from wind turbines was less than 410 ft (125 m) from the base of the wind turbine. Similarly, a study of a 295-ft (90-m) tall wind turbine installed on a ski mountain in Switzerland found the farthest ice pieces landed from the wind turbine was 295 ft (90 m).

Invenergy's experience at wind farms with 1.5-MW and larger turbines in U.S. cold climates indicates that the farthest ice and snow have been shed from turbines is 500 ft (152 m), with the majority of any ice or snow falling under the turbine blades, or approximately 150 ft (46 m) from the base of the wind turbine.

In the Project area, it is expected that there will be little danger to public safety from falling ice because the Project is in a remote location with significant setbacks from residences. All turbines are farther than 3,000 ft (914 m) from the nearest non-participating residence, and most turbines are more than 1.0 mile (1.6 km) from the nearest residence. Likewise, County Route 10/1 is the only public road located within 500 ft (152 m) of wind turbines in the Project area. This road has limited use (Average Daily Traffic = 30), and the closest turbine is located 425 ft (130 m) from this road.

Waste Materials. During operations, BRE will ensure that all waste materials are picked up and removed from the Project area.

Hazardous Materials. The only hazardous chemicals anticipated to be on-site are the chemicals contained in diesel fuel, gasoline, coolant (ethylene glycol), and lubricants in machinery. BRE and its contractors will comply with all applicable hazardous material laws and regulations existing or hereafter enacted or promulgated regarding these chemicals and will implement a Spill Prevention, Control, and Countermeasure Plan (SPCCP), as necessary. Hazardous chemicals contained in diesel fuel, gasoline, coolant (ethylene glycol), and lubricants will not be stored within 100 ft (30 m) of any stream, nor will any vehicle refueling or routine maintenance occur within 100 ft (30 m) of streams. When work is conducted in and adjacent to streams, fuels and coolants will be contained in the fuel tanks and radiators of vehicles or other equipment.

2.1.4.2 Operations and Maintenance

BRE will perform Project O&M for the life of project, anticipated to be a minimum of 20 years. BRE and the turbine supplier will control, monitor, operate, and maintain the Project by means of the SCADA system, and regularly scheduled on-site inspections will be conducted. BRE anticipates that approximately seven to 20 O&M staff will be employed throughout the life of project.

All maintenance activities would occur within areas previously disturbed by construction, so no new ground disturbance will occur during O&M of the project. Turbine maintenance is typically performed up-tower (i.e., O&M personnel climb the towers and perform maintenance within the tower or nacelle and access the towers using pick-up trucks, so no heavy equipment in needed). In the unlikely event (it may never occur) that a large crane would be needed for maintenance, vegetation would be cleared within the area previously disturbed during construction to provide for safe and efficient operation of the crane, but no tree removal or soil disturbance would be necessary. Ground-disturbing activities may include occasional need to access underground cable or communications lines.

Vegetation within 130 ft (40 m) around turbines to be monitored will be regularly mowed to improve searcher ability to find bird and bat carcasses (Appendix C).

The transmission line route and other Project areas will be inspected for hazard trees that may pose safety threats or potential damage to Project facilities. Hazard trees will be trimmed or cut as needed. Inspections and tree cutting needed for these purposes will occur between November 15 and March 31 to ensure no potential for direct impacts to Indiana bats or Virginia big-eared bats, except in an emergency where there is a risk to public safety.

2.1.4.3 Decommissioning and Restoration

BRE has a contractual obligation with the landowner to remove the wind turbines and foundations if and when the Project is no longer viable for operation and if BRE determines that the site cannot be retrofitted with newer more efficient turbines. BRE's WVPSC siting certificate includes an obligation to maintain a Decommissioning Fund sufficient to cover the cost of the removal of all improvements to 4 ft (1 m) below grade. The fund has been established with the Greenbrier County Commission. No later than 90 days after the USFWS announces a final decision on BRE's application for an ITP, BRE will decommission ten turbine foundations that were built to be included in the 67-existing turbines but were later removed from the Project as part of the settlement agreement.

At the end of the Project's useful life, BRE expects to explore alternatives for decommissioning the Project. One option may be to continue operation of the Project, providing energy under a new long-term contract with a power purchaser or on a merchant basis. In that case, BRE would reapply for new or amended required permits to retrofit the turbines and power system with upgrades based on new technology to allow the Project to produce power efficiently and successfully for additional years.

In accordance with WVPSC requirements (which require decommissioning of selected Project facilities) and BRE's lease agreements with the landowner (which also contain decommissioning requirements), BRE has addressed how decommissioning would take place in the event it removes the facility. If it were determined that the wind turbines would not be replaced or repowered after 20 years, the following sequence for removal of components would be implemented.

- Turbines, transmission line, and substation would be dismantled and removed.
- Pad-mounted transformers would be removed.
- All turbine and substation foundations would be removed to a depth of 4 ft (1 m).
- Disturbed areas and access roads would be graded to as near as practicable the original contour, if the landowner requests that BRE decommission these areas. If requested by the landowner, access roads will be left in place.

The Decommissioning Fund for the first 67 turbines is already in place and would be updated as the 33-turbine phase approaches commercial operation. The Decommissioning Fund covers dismantling of the turbines and towers, as well as land reclamation, monitoring of revegetation success, and reseeding if needed to ensure revegetation success. Ground cover (vegetation) must cover at least 70% of the given disturbed area based on specific state reclamation requirements before the SWPPP can be terminated. An independent expert was engaged to assess the size of fund needed based on resale or salvage value of the Project components. This estimate will be re-assessed periodically and reported to the WVPSC.

2.1.4.4 Environmental Conservation and Mitigation Measures

BRE proposes to implement a variety of environmental mitigation measures as a part of the construction operation and decommissioning of the proposed facility. These measures, which include conditions of various local, state, and federal permits and environmental laws, are summarized below. Although USFWS is not the governmental entity responsible for implementing some of these processes or laws, it considers these conservation measures as part of the project description when analyzing potential effects to wildlife resources under the ESA and NEPA.

Construction, Operations, and Maintenance Practices. BRE and its contractors will comply with all federal, state, and local environmental laws, orders, and regulations. Prior to construction, all supervisory construction personnel will be instructed on the protection of cultural and ecological resources including (1) federal and state laws regarding antiquities and plants and wildlife, including collection and removal, and (2) the importance of these resources and the purpose and necessity of protecting them. This information is disseminated through the contractor hierarchy to ensure that all appropriate staff members are aware of the correct procedures and responsibility to report (see Section 3.2.2 in the Research, Monitoring, and Adaptive Management Plan [RMAMP] for wildlife handling and reporting procedures).

Minimizing Disturbance and Erosion Control. SWPPPs will be prepared to ensure that erosion is minimized during storm events, and they will be kept on-site at all construction sites, as well as in the construction contractors' offices. BRE and its contractors will implement the SWPPPs. In order to minimize damage to the land surface and property, they will limit the movement of crews and equipment to the Project site, including access routes, to that which is necessary for safe and efficient construction. When weather and ground conditions permit, construction-caused deep ruts will be leveled, filled and graded, or otherwise eliminated. Ruts, scars, and compacted soils will be loosened and leveled using a ripper or disc or other landowner-approved method. Damage to ditches, roads, and other features of the land will be repaired. Water bars or small terraces will be constructed along access road ditches on hillsides to minimize water erosion and to facilitate natural revegetation.

Restoration and Reclamation. Roads, portions of roads, crane paths, and staging areas not required for operation and maintenance will be restored to the original contour and made impassable to vehicular traffic. Areas to be reclaimed will be contoured, graded, and seeded as needed to promote successful revegetation, to provide for proper drainage, and to prevent erosion. The seed mixtures used for the 67-turbine phase are shown in Table 2.3. Seed mixtures used for reclamation of areas disturbed during construction of the 33-turbine phase will likely be similar and will be based on requirements or recommendations by WVDEP or specific requests by the landowner. BRE intends to maintain areas needed for O&M clear of trees, which will

Table 2.3 Seed Mixtures Used During Reclamation of the 67-turbine Phase.

Mix #1 - Species/Percent of Application[1]	Mix #2 - Species/Percent of Application[2]
Annual Rye – 49%	Annual Ryegrass – 47.7%
Red Fescue – 29.4%	Fawn Tall Fescue – 14.4%
Perennial Rye – 19.6%	AllSport II Perennial Ryegrass – 19.1%
	Trefoil – 7.6%
	Med Red Clover – 9.5%
	Other Crop Seed – 1.1%
	Inert Matter – 1.2%

[1]Known as Contractors Gold Mix [2]Known as Erosion Gold

have the added benefit of not providing roosting habitat for listed bats within the Project area, thus tree planting is not included in the reclamation plan.

Contamination. Construction activities will be performed using standard construction best management practices so as to minimize the potential for accidental spills of solid material, contaminants, debris, and other pollutants. Excavated material or other construction materials will not be stockpiled or deposited within 305 ft (100 m) of streams.

Waste Materials. No burning or burying of waste materials will occur at the Project site. The contractor will be responsible for the removal of all waste materials from the construction area. BRE will dispose of all contaminated soil and construction debris in approved landfills in accordance with appropriate environmental regulations.

Traffic Control. BRE will require its contractors to make all necessary provisions in conformance with safety requirements for maintaining the flow of public traffic on all public roads used for the project and will conduct construction operations so as to offer the least possible obstruction and inconvenience to public traffic.

Riparian Areas. BRE will require that its contractors span riparian areas located along the transmission line right-of-way and avoid physical disturbance to riparian vegetation. Equipment and vehicles will not cross riparian areas on the right-of-way during operation or decommissioning activities. Existing bridges or fords would be used to access the right-of-way on either side of riparian areas. During construction of the additional 33 turbines, riparian areas will be avoided, where feasible. If avoidance is not feasible, activities within riparian areas will be conducted in conformance with WVDEP SWPPP requirements.

Fire Suppression and Control. BRE will design, install, and implement a fire protection system, using industrial best practices and in accordance with all applicable fire safety codes. BRE will coordinate with fire, safety, and emergency personnel during all stages of the project to promote efficient and timely emergency preparedness and response. BRE will designate a representative to be in charge of fire control during construction. The fire representative will ensure that each construction crew has appropriate types and amounts of fire fighting tools and equipment such as extinguishers, shovels, and axes available at all times. BRE will, at all times during construction and operation, require that satisfactory spark arresters be maintained on internal combustion engines.

Cultural Resources. For the existing 67-turbine phase of the project, BRE submitted a draft MOA to WVDCH on February 15, 2008, to address noise and viewshed effects that could be considered adverse to the 20 National Register of Historic Places-eligible historic buildings and structures within the 5-mile (8-km) historic structures Area of Potential Effect (APE) resulting from the then-proposed 124-turbine layout approved by the WVPSC. As mitigation for potential adverse effects, the MOA provided for six copies of the Architectural Investigations report for the Project (dated March 6, 2007) to be deposited in local public libraries and historical societies and for a one-time monetary payment of $10,000 for future assistance in historic preservation-related activities conducted by the Greenbrier Historical Society or the Williamsburg Historical Foundation. The MOA also contained detailed information regarding archaeological surveys that will be conducted once design has sufficiently advanced to the point where locations of ground disturbing activity are known. The WVDCH signed the MOA on July 31, 2008, and BRE signed on August 4, 2008. Prior to construction of the 67-turbines, BRE avoided all potential impacts to archaeological resources and received WVDCH concurrence on this avoidance.

Phase I cultural resource inventories for both phases of the project will be completed on all land proposed for surface disturbance. Any cultural resource (historic or prehistoric site or object) discovered by BRE or any person working on its behalf will be immediately reported to BRE. BRE will suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the SHPO. An evaluation of the discovery will be made by the SHPO to determine appropriate actions to prevent the loss of significant cultural or scientific values. BRE will be responsible for the cost of evaluation, and any decision as to proper mitigation measures will be made by the SHPO after consulting with BRE. Any affects to historic resources by the construction and operation of the 33-turbine expansion will be mitigated using measures approved by the SHPO. BRE is responsible for meeting WVPSC requirements for consultation with the SHPO pursuant to state law, whereas the USFWS is responsible for satisfying requirements for federal consultation with the SHPO pursuant to the NHPA.

BRE will enter into an MOA with the WVPSC, USFWS, and SHPO to address cultural resources issues associated with the 33-turbine expansion. These parties will execute the MOA prior to ITP issuance. The consultation process defined in the MOA will be implemented after ITP issuance but prior to construction, including, but not limited to, completion of required archaeological surveys. In preparation for the MOA, BRE and its consultants analyzed potential effects to properties located within 5 miles (8 km) of the 33-turbine expansion. BRE submitted the *Draft Reconnaissance-Level Architectural Survey for the Proposed Expansion/Modification of the Beech Ridge Energy Facility, Greenbrier and Nicholas Counties, West Virginia* (Gray and Pape, Inc. 2011a) to the WVSHPO and USFWS on May 18, 2011. After reviewing comments from WVSHPO and USFWS, BRE revised the report. On August 22, 2011, BRE submitted the *Final Reconnaissance-Level Architectural Survey for the Proposed Expansion/Modification of the Beech Ridge Energy Facility, Greenbrier and Nicholas Counties, West Virginia* (Gray and Pape, Inc. 2011b).

On October 4, 2011, BRE submitted the *Draft Assessment of Effects for the Proposed Expansion/Modification of the Beech Ridge Wind Energy Facility, Greenbrier and Nicholas Counties, West Virginia* (Gray and Pape, Inc. 2011c) to the SHPO and USFWS. Once they review and comment, BRE and its consultants will finalize the report and work with SHPO and USFWS to detail potential visual and noise effects to National Register of Historic Places-eligible properties and any necessary mitigation.

The USFWS is consulting with Native American tribes. Only the Catawba Nation has requested additional information, and per their request, the USFWS has provided copies of the archaeological reports cited in this section. Detail on Native American consultation is provided in the EIS.

Based on the May 2011 Draft Report (Gray and Pape 2011a), BRE anticipates that the combined effects of the existing 67-turbines and the 33-turbine expansion on historic resources will be less significant than the effects associated with the 124-turbine layout (as detailed in the March 6, 2007 Architectural Investigations report) due to the reduced number of turbines and the reduced number of historic resources within the APE.

In September 2011, BRE submitted the *Draft Archaeological Investigation Desktop Report* (Cultural Resources Analysts, Inc. 2011) to SHPO and USFWS. Once they review and comment, BRE and its consultants will finalize a procedure for identifying and avoiding any potential impacts from the 33-turbine expansion on archaeological resources. Based on the Draft Archaeological Investigations, BRE anticipates that it will be able to avoid any significant impacts to archaeological resources from the 33-turbine expansion by using a process similar to the one required by the 2008 MOA.

<u>Air Quality/Noise</u>. All vehicles and construction equipment will be maintained to minimize exhaust emissions and will be properly muffled to minimize noise. Disturbed areas will be watered as necessary to suppress dust. Construction-related concrete batch plants will acquire the appropriate authorization for operation from the WVDEP Air Quality Office. Authorization will be acquired prior to the commencement of construction.

<u>Vegetation</u>. To minimize indirect impacts to vegetation, BRE will implement best management practices during construction and operation of the Project to protect topsoil and adjacent resources and to minimize soil erosion. Practices may include containing excavated material, protecting exposed soil and stabilizing restored material, and re-vegetating areas as necessary. Plans to utilize existing roads within the Project area with little development of new access roads and the use of existing areas of previously disturbed land resulting from mining or construction activities for a portion of the turbine foundation sites will reduce vegetation impacts within the Project area. In addition, BRE will undertake the following measures.

- Surface disturbance will be limited to that which is necessary for safe and efficient construction.
- All surface-disturbed areas will be restored to the approximate original contour and reclaimed in accordance with easement agreements.
- Removal or disturbance of vegetation will be minimized through site management (e.g., by utilizing previously disturbed areas, designating limited equipment/materials storage yards and staging areas, scalping) and reclaiming all disturbed areas not required for operations.

No construction or routine maintenance activities will be conducted when soil is too wet to adequately support construction equipment (i.e., if such equipment creates ruts in excess of 4 inches deep). Certified weed-free straw mulches, certified weed-free hay bale barriers, silt fences, and water bars will be used to control soil erosion. Soil erosion control measures will be monitored, especially after storms, and will be repaired or replaced if needed. Surface disturbance will be limited to that which is necessary for safe and efficient construction. All surface-disturbed areas will be restored to the approximate original contour and reclaimed in accordance with easement agreements. Construction activities in areas of moderate to steep slopes (≥15-20%) will be avoided, where possible.

Noxious Weed Management. BRE will use mechanical measures to control noxious weeds in all surface-disturbed areas. Equipment will be washed at a commercial facility prior to construction and on-site during construction if weeds are encountered in the Project area. No herbicides will be used to control vegetation.

Surface and Ground Water Protection. The Project has been designed to avoid direct impacts (both temporary and permanent) to surface water features. Two SWPPPs were prepared for the Project, and WVDEP approved coverage under the Storm Water Construction General Permit. The first SWPPP, permit #WVR102962 dated July 2007, includes approximately 14 miles (22 km) of transmission line, a new substation, the construction staging area, and approximately 42 wind turbine towers and related access roads. The second SWPPP, permit #WVR103543 dated February 2008, includes 79 wind turbines and related access roads. An NOI was submitted and approved by WVDEP. BRE submitted site registration applications to the WVDEP for coverage under an existing National Pollutant Discharge and Elimination System (NPDES) permit. Activities associated with this Project were approved under West Virginia/NPDES Storm Water Construction General Permit No. WV0115924. A third permit submitted by a BRE contractor, permit #WVR104703 approved in October 2009, was associated with the Beech Ridge O&M Facility.

Conditions contained in the permits require weekly inspections (and after 0.5 inch [1.3 cm] or greater of rainfall) and prompt reporting and repair of any problems with silt fences or other erosion control measures. Construction of the 33 additional turbines will be regulated and approved by the WVDEP. A specific SWPPP, NPDES Permit, and Groundwater Protection Plan will be submitted to and approved by the WVDEP for those activities associated with the construction of the additional 33 turbines prior to construction.

Water withdrawal from streams for the purposes of dust control will be accomplished in a manner that preserves stream flows during withdrawal.

Water Crossings. BRE will continue to comply with all federal regulations concerning the crossing of waters of the U.S., as listed in Title 33 C.F.R. Part 323. The wind turbines and ancillary facilities will be built on ridges, which avoid the surface water features and designated floodplains. Wind turbines will not be placed in areas containing waters of the U.S. Refueling and staging will occur at least 300 ft (91 m) from the edge of a channel bank at all stream channels. Sediment control measures will be utilized. Vegetation disturbance will be limited to that which is necessary for construction.

Ground Water Protection. BRE developed a ground water protection plan as part of the SWPPP that will be implemented and kept on-site during all construction activities. The ground water protection plan details procedures that will be used to protect ground water resources such as using double-walled tanks or providing secondary containment. Wind turbine locations will not impact the use of existing water wells because the turbines will not be sited within 500 ft (152 m) of occupied structures. A new plan, specific to the construction of the 33 additional turbines, will be developed in accordance with WVDEP regulations and included with the new SWPPP.

Wetlands and Streams. BRE completed field surveys for the original 124-turbine layout from August 31 to September 9, 2005, to determine the presence of jurisdictional wetlands and streams within the footprint of each turbine location and any new access roads that may be constructed. BRE avoided all wetlands and streams during construction of the 67-turbine phase so no Section 404 permit coverage was required. Field surveys were conducted November 2 through November 7, 2005, to determine the presence of jurisdictional wetlands and streams that may be crossed by the proposed transmission line or impacted by placement of the transmission line poles for the proposed Project. Transmission line construction was authorized under a Nationwide Permit from the U.S. Army Corps of Engineers on October 3, 2006. Field surveys for the 33-turbine expansion area were completed between September 21 and October 1, 2010. The results of the field surveys identified ten streams (five perennial, four ephemeral, and one intermittent) and five wetlands. Of the five wetlands, 0.44 acre was determined to be jurisdictional, and 0.66 acre was determined to be isolated in nature. BRE is awaiting confirmation and verification of this delineation from the U.S. Army Corps of Engineers. It is likely that most, if not all, jurisdictional waters will be avoided. Once the layout for the 33-turbine phase has been finalized, results of the field surveys and a summary of impacts will be submitted to the U.S. Army Corps of Engineers, and the required authorizations/permits will be obtained.

<u>Wildlife Protection Measures</u>. BRE prohibits hunting, fishing, dogs, or possession of firearms by its employees and its designated contractor(s) in the Project area during construction, operation, and maintenance. BRE will advise project personnel regarding speed limits on roads (25 mph) to minimize wildlife mortality due to vehicle collisions. Potential increases in poaching will be minimized through employee and contractor education regarding wildlife laws. If violations are discovered, the offense will be reported to the WVDNR, and the offending employee or contractor will be disciplined and may be dismissed by BRE and/or prosecuted by the WVDNR. Travel will be restricted to designated roads; no off-road travel will be allowed except in emergencies.

BRE's draft APP (BRE 2011) provides a detailed description of how BRE has incorporated recommendations found in the document *Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines* (USFWS 2003) and the WTGAC (2010) recommendations into the project, and the USFWS has included this information in its draft EIS. Measures including but not limited to the use of state-of-the-art turbine technology, including unguyed tubular towers and slow-rotating upwind rotors. The Project avoids fragmentation of wildlife habitat through the use, where practical, of lands already disturbed, minimizes new roads by using existing roadways, and addresses the accumulation of standing water through the use of an SWPPP. In addition, the Project has implemented Avian Power Line Interaction Committee (1996) recommendations to ensure that designs minimizing collision and electrocution risks are incorporated into electrical generation, transmission, and distribution. BRE commissioned avian and bat risk assessments, as well as preconstruction avian and bat surveys, of the Project area (see Sections 3.2.1.8 and 3.2.2.8 for a summary of bat survey results and the APP for a summary of bird survey results). Measures taken to avoid and minimize impacts to migratory birds and eagles, including those listed above, are presented in the draft EIS and will be included in BRE's APP when finalized.

BRE has consulted and coordinated with USFWS and WVDNR for all mitigation activities related to bats, eagles, other raptors, and other migratory birds. BRE will implement the RMAMP presented in Appendix C and the APP.

Visual Resources. BRE developed the wind farm layout so that turbines were located farther than 3,000 ft (914 m) from the nearest non-participating residence, and most turbines are more than 1.0 mile (1.6 km) from the nearest existing residences. BRE removed nine turbines from the easternmost part of the Project area to address visual concerns. To limit adverse aesthetic effects of the wind farm, the turbines will be lighted only as required by FAA regulations, plus a low-voltage light on a motion sensor at the entrance door to each turbine. Turbines will be coated/painted a non-reflective white. Existing roads will be used for construction and maintenance where possible, minimizing the need for new road construction. Access roads created for the Project will be located along ridge tops when possible to minimize visible cuts and fills.

Noise. Effective exhaust mufflers will be installed and properly maintained on all construction equipment. BRE will require construction contractors to comply with federal limits on truck noise. BRE will require contractors to use pile-driving equipment that has the least noise impact and to restrict pile driving to weekdays between 7 a.m. to 7 p.m. Construction activities will take place mostly during daylight hours. Construction contractors will be required to ensure their employee and delivery vehicles are driven responsibly. BRE and its contractors will adhere to a project-wide speed limit of 25 mph or lower depending on the requirements of the specific equipment utilizing the roads. Nighttime construction work will be minimized, and when it does occur, it generally will be limited to relatively quiet activities. Construction during church hours will be limited. The community will be notified in advance of any blasting activity, and blasting will be limited to daylight hours and will follow all state and federal rules, regulations, and laws.

2.1.4.5 Project Size and Site Clearing

Project Size. The original design of the Project presented in the WVPSC siting certificate was for construction and operation of 124 turbines at the site. As a result of discussions and negotiations with environmental organizations as reflected in a January 26, 2010, settlement agreement,[7] the Project was reduced to 100 turbines, and turbine sites within the eastern portions of the project—which are closest to the known Indiana bat hibernacula (Snedegar and Martha caves), historical hibernacula (Bob Gee Cave), and the proximate area where most caves occur (BHE Environmental Inc. [BHE] 2006a)—were eliminated from the Project. Prior to Project design changes, the nearest turbine to the hibernacula was approximately 6.0 miles (9.7 km) (Snedegar Cave) and 9.0 miles (14.5 km) (Martha Cave) (BHE 2006a). After design changes, this distance increased to 9.3 miles (14.9 km) and 12.9 miles (20.6 km), respectively. These Project siting and design measures help avoid and minimize potential take of Indiana bats by reducing the overall risk associated with project size (number of turbines) and by increasing the distance between known bat locations and the Project. As a result of the changes to the original siting certificate area, portions of the current proposed expansion area (for the additional 33

[7] *See Animal Welfare Institute, et al. v. Beech Ridge Energy LLC, et al.,* No. RWT 09cv1519 (S.D. MA January 26, 2010).

turbines) fall outside the original siting certificate area; however, these areas are east of the current project and farther from the known caves (see Figure 1.2).

Project Site Clearing. To avoid potential take of roosting Indiana bats, BRE will limit its tree clearing during construction of the expansion to the period between November 15 and March 31, except that up to 15 acres may be cleared between April 1 and May 15 or between October 15 and November 14. Tree clearing will occur in the expansion area shown on Figure 1.2. The additional 30 to 45 days are needed to provide BRE flexibility to complete clearing should weather or deep snow or ice prevent clearing or create safety issues for construction workers. The clearing of up to 15 acres of trees, outside of the hibernation period, will be conducted within 5 years of the 2010 mist-netting survey, during which no Indiana bats were captured and so it is unlikely to impact roosting Indiana bats.

2.2 Covered Activities

The HCP handbook suggests that the applicant "include in the HCP a description of all actions within the planning area that: (1) are likely to result in incidental take; (2) are reasonably certain to occur over the life of the permit; and (3) for which the applicant or landowner has some form of control" (USFWS and National Marine Fisheries Service [NMFS] 1996).

As discussed below, BRE has determined that Project-related activities that could potentially result in take of Indiana or Virginia big-eared bat include:

(1) Operation of the existing 67 turbines over the 20-year life of project;
(2) Construction of associated infrastructure including but not limited to roads, staging areas, and a batch plant for 33 additional turbines;
(3) Construction and operation of 33 additional turbines over the 20-year life of project; and
(4) Maintenance and decommissioning of the 100-turbine project (and all associated facilities including, but not limited to, the substation and transmission line).

BRE proposes a number of conservation measures to minimize and mitigate potential take that may occur as a result of Project construction and operations presented below in Section 5.0.

The following three sections provide a summary of covered activities and potential for take of listed species. Detailed impact analyses are presented in Section 4.0.

2.2.1 Operation of the Beech Ridge Project

Currently, the Project consists of 67 turbines that were brought online between April 1 and August 15, 2010. The final 33-turbine phase will be constructed pending issuance of the ITP. Commercial operation of the final 33 turbines is expected to occur immediately upon completion of construction.

BRE anticipates that the Project will be operated for a minimum of 20 years. BRE and the turbine supplier(s) would control, monitor, operate, and maintain the Project by means of the SCADA system, and regularly scheduled on-site inspections would be conducted. BRE anticipates that approximately seven to 20 O&M staff would be employed throughout the life of project.

The physical operation of the turbines (spinning rotors and associated changes in air pressure in the rotor-swept area) may result in the take of covered species.

2.2.2 Construction of the 33 Additional Turbines

The construction of the 33 additional turbines could result in take of Indiana bat or Virginia big-eared bat if such construction involves destruction of a tree with roosting Indiana bats or Virginia big-eared bats. Conversion of 124 acres of forested lands to grass/shrublands could also reduce available Indiana bat and Virginia big-eared bat foraging habitat. Available information indicates that neither of these actions is likely to result in take of covered species (analysis provided in Section 4.0). Based on the site-specific information from the existing 67-turbine phase, the 33-turbine expansion phase, and the transmission line route, little potential exists for destroying a roost tree with an Indiana bat or Virginia big-eared bat present. The elevation of the site and location in relation to known hibernacula and known summer maternity colonies likely limits use of the site to migrating and or fall swarming individuals (BHE 2006a, 2006b; USFWS 2007). Foraging bats have ample adjacent similar habitats in which to feed.

2.2.3 Maintenance Activities and Project Decommissioning

General maintenance activities for the facility are not expected to lead to impacts that would rise to the level of take because maintenance activities involve periodic activities conducted during daylight hours, typically inside turbines or other structures. Also, activities for removal of the turbines, transmission line, substation, and other facilities during decommissioning are not expected to lead to impacts that rise to the level of take because they would similarly be conducted during daylight hours. The only activity during maintenance or decommissioning of the Project that could result in take would be tree cutting for safety reasons. It is unlikely this activity will cause the take of Indiana bat or Virginia big-eared bat given the infrequent occurrence of these species in the Project area (see Chapter 4.0 Impact Assessment/Take Assessment).

3.0 ENVIRONMENTAL SETTING / BIOLOGICAL RESOURCES

3.1 Environmental Setting

The Project area lies within the Central Appalachian Broadleaf Forest Ecological Subregion (Bailey 1997; McNab and Avers 1994). Within this subregion, the Project is located in southern portion of the Allegheny Mountains ecological section. The Mountaineer, Meyersdale, Casselman, and Mount Storm wind projects are also located within the Allegheny Mountains section (see Figure 1.1). The Criterion wind project was recently completed, the Laurel Mountain and Pinnacle wind projects are currently under construction, and the proposed New Creek wind project is anticipated to begin construction in 2012.

The Allegheny Mountains section comprises part of the Appalachian Plateau physiographic province and is characterized by a dissected plateau of high ridges, low mountains, and narrow valleys. Bedrock is covered by residuum on the ridges and mountain tops, colluvium on the slopes, and alluvial materials in the valleys. Devonian shale and siltstone, Mississippian carbonates and sandstones, and Pennsylvanian shale, sandstone, and coal form the bedrock. Sandstone and sturdy carbonates support upland areas, and weaker carbonates and shale underlie valleys (McNab and Avers 1994).

Vegetation of the Allegheny Mountains section is categorized in four forest groups influenced by elevation and aspect: red spruce (*Picea rubens*), northern hardwoods, mixed mesophytic, and oak (*Quercus* sp). Red spruce is characteristic above 3,500 ft (1,060 m) and includes American beech (*Fagus grandifolia*) and yellow birch (*Betula alleghaniensis*). The northern hardwood forests include sugar maple (*Acer saccharum*) occurring with beech and black cherry (*Prunus serotina*). Mixed mesophytic forest occurs in the transition zones to drier forest types and dominant species include red oak (*Quercus rubra*), basswood (*Tilia americana*), white ash (*Fraxinus americana*), and tulip poplar (*Liriodendron tulipifera*). Oak forests are typically found on drier slopes and are characterized by red and white oak (*Quercus alba*) (McNab and Avers 1994). Approximately three-quarters of Greenbrier County, West Virginia, is forested (BHE 2006a).

Precipitation in the Allegheny Mountains typically ranges from 45 to 60 inches (114 to 152 cm) per year, with approximately 20% to 30% being snowfall. Monthly average temperatures range from 39 to 54°F (4 to 12°C). The growing season ranges from 140 to 160 days (U.S. Forest Service 1994). Within the Project area, the dominant soil types belong to the Dekalb-Gilpin stony complex (Gorman et al. 1972).

The Project area occurs on a larger property that is managed for commercial timber. Of the 48,000 acres within 0.5 mile (0.8 km) of the site, approximately 79% is characterized as timber greater than 26 years old, 19% is characterized as timber less than 26 years old, and 2% is non-forested (e.g., roads, surface mines) (BHE 2006a). Historical land use included timber harvesting and surface coal mining. The Project area is largely forested, interspersed with areas cleared for roads, timber harvest activities, and historic mining activities. Dominant species include oaks, sugar maple, black cherry, white ash, and Mountain maple (*Acer spicatum*) (BHE 2006a).

Construction of the 67-turbine phase resulted in approximately 336 acres of habitat conversion from predominantly forest to grassland/scrub shrub habitat and approximately 50 acres of life of project impacts that could be reclaimed to grass/shrub vegetation during project decommissioning if so requested by the landowner. The life of project disturbance is associated with 9 acres at the turbine sites, 16 acres for new roads, 11 acres for transmission line access, 8 acres for collection line trenching, 3 acres for permanent met towers, 2 acres for the O&M facility, and 1 acre for the substation. Temporary land disturbances have been reclaimed and revegetated with grass and forb seed mixtures (see Table 2.3). Disturbance occurred primarily in deciduous forest vegetation. The site contains a mix of oaks, maples, black locust, and black cherry, approximately 79% of which are greater than 26 years old and 19% of which are less than 26 years old. An estimated 2% of the Project site is non-forested.[8]

3.2 Covered Species

3.2.1 Indiana Bat


Courtesy R. Fields, IDNR

www.fws.gov/Midwest/Endangered/mammals/inba/inba-photos.html

Indiana bat was included on the list of endangered species in 1967 prior to the enactment of the ESA (USFWS 1967). The revised draft recovery plan lists destruction/degradation of hibernation habitat; loss/degradation of summer habitat, migration habitat, and swarming habitat; disturbance of hibernating bats; disturbance of summering bats; disease and parasites; and natural and anthropogenic factors as threats to the species (USFWS 2007).

3.2.1.1 Life History and Characteristics

Indiana bats exhibit life history traits similar to other temperate vespertilionid bats. Despite their small size, they are relatively long-lived and typically produce one pup per year, life-history strategies that may be influenced by constraints of their ability to fly (Barclay and Harder 2005). Similar to most temperate *Myotis* species, female Indiana bats give birth to one offspring per year (Humphrey et al. 1977; Kurta and Rice 2002). Mating occurs in the vicinity of the hibernacula in late summer and early fall, and fertilization is delayed until the spring (Guthrie 1933). Timing of parturition and lactation are likely dependent in part on latitude and weather conditions. For example, in Iowa, female bats arrive at maternity roosts at the end of April, and parturition is completed by mid-July (Clark et al. 1987); in Michigan, young are born in late June or early July (Kurta and Rice 2002); and in southern Indiana, pregnant females are known from May 28 through June 30, while lactation has been recorded from June 10 to July 29 (Whitaker and Brack 2002). Young bats are volant within 3 to 5 weeks of birth, at which time the maternity colony begins to disperse, and use of primary maternity roosts diminishes. Females and juveniles may remain in the colony area until migration to hibernacula; however, at this time the bats become more gregarious. It is likely that

[8] Letter from Thomas Chapman, Field Supervisor, USFWS West Virginia Field Office, March 7, 2006, to Russ Romme, BHE Environmental.

once the young are born, females leave their pups in the diurnal roost while they forage, returning during the night periodically to feed them (Barclay and Kurta 2007). Females will, however, switch roost trees regularly, and during these switches, they likely carry flightless young. Indiana bat maternity colonies will use several roosts; in Missouri, each maternity colony used from 10 to 20 separate roost trees (Miller et al. 2002). In Kentucky, Gumbert et al. (2002) recorded 463 roost switches over 921 radio-tracking days of tagged Indiana bats, for an average of one switch every 2.21 days. Consecutive use of roost trees by individual bats ranged from 1 to 12 days. There are a number of reasons suggested for roost switching, including thermoregulation, predator avoidance, and reduced suitability of roost trees, which are an ephemeral resource and can become unusable if they are toppled by wind, lose large pieces of bark, or are otherwise destroyed (Kurta et al. 2002; Barclay and Kurta 2007).

Indiana bats return to the vicinity of hibernacula in late summer and early fall where they exhibit a behavior known as "swarming." This involves large numbers of bats that fly in and out of cave entrances from dusk to dawn, though a few bats roost in the cave during the day (Cope and Humphrey 1977). During the swarming period, most Indiana bats roost within approximately 1.5 miles (2.4 km) of the cave, suggesting that the forests around caves provide important habitat prior to hibernation (USFWS 2007). It is at this time that bats gain fat stores vital for winter survival and when mating occurs. While females enter the hibernaculum soon after arrival at the site, males remain active for a longer period and may also travel between hibernacula, both of which may increase mating opportunities (USFWS 2007).

Spring emergence from hibernacula generally occurs from mid-April to the end of May and varies across the range depending on latitude and weather conditions (USFWS 2007). Exit counts from Big Springs Cave in Tucker County, West Virginia, suggest that peak spring emergence typically occurs in mid-April (USFWS 2007). Females typically emerge before males, traveling sometimes hundreds of miles to their summer habitat (Winhold and Kurta 2006).

3.2.1.2 Habitat Requirements

Indiana bats have two distinct habitat requirements: a stable environment in which to hibernate during the winter and woodland habitat for maternity roosts in the summer. Males may use hibernacula or tree roosts during the summer. Prior to hibernation, both male and female bats use wooded habitat in the vicinity of the hibernacula to roost.

3.2.1.3 Winter Habitat

Indiana bats typically hibernate between October and April, although this may be extended from September to May in northern parts of their range (USFWS 2007). The majority of hibernacula are located in karst areas of the east-central U.S.; however, they are known to hibernate in other cave-like locations such as abandoned mines, a railroad tunnel in Pennsylvania, and a hydroelectric dam in Michigan (Hicks and Novak 2002; Kurta and Teramino 1994; USFWS 2007). Indiana bats typically require low, stable temperatures (37 to 52º F [3 to 11°C]) for successful hibernation (Brack 2004; Tuttle and Kennedy 2002). Caves with the highest Indiana bat populations are typically large complex systems that allow air flow, but the volume and complexity often buffer or slow any changes in temperature (Brack 2004). These complexes often have large rooms or vertical passages below the lowest entrance that allow entrapment of cold air that is stored throughout the summer, providing arriving bats with relatively low temperatures in early fall (Tuttle and Kennedy 2002). Bats are able to decrease exposure to fluctuating air temperatures by increasing surface contact with the cave or with other individuals, and Indiana bats tend to hibernate in large dense clusters ranging from 300 to 500 bats per square foot (USFWS 2007).

3.2.1.4 Spring, Summer, and Fall Habitat

The first maternity colony of Indiana bats was located in 1971 (Cope et al. 1974; Gardner and Cook 2002) and, to date, much of the work pertaining to summer habitat has concentrated on females. Following hibernation, female bats disperse up to 350 miles (560 km) to their summer habitat where they form maternity colonies (Winhold and Kurta 2006), although Indiana bats tracked in the northeastern U.S. appear to travel shorter distances (<35 miles [56 km]) (Hicks 2007; USFWS 2007). Tracking studies in Pennsylvania, New Jersey, and New York conducted by Chenger and Sanders from 2000 to 2007 found that the females tracked (25 individual females) moved between approximately 8 and 92 miles with an average of approximately 20.2 miles from the hibernacula (Sanders and Chenger 2000, Sanders et al. 2001, Chenger 2006, Chenger and Sanders 2007, Chenger et al. 2007b).

Members of a maternity colony do not necessarily hibernate in the same location, and individuals from the same maternity colony may hibernate in hibernacula almost 200 miles (322 km) apart (Kurta and Murray 2002; Winhold and Kurta 2006). Maternity colonies appear to be highly philopatric, using the same areas and same roosts in successive years (Barclay and Kurta 2007; Callahan et al. 1997; Humphrey et al. 1977). Maternity colonies can vary greatly in size in terms of number of individuals and number of roost trees used, with members of the same colony sometimes utilizing over 20 trees during a season (Kurta 2004). An important characteristic for the location of maternity roost sites is a mosaic of woodland and open areas, with the majority of maternity colonies having been found in agricultural areas with fragmented forests (USFWS 2007). Kurta (2004) analyzed data from 393 roost trees in eleven states and found that 33 tree species were used, with ash (*Fraxinus* sp.), elm (*Ulmus* sp.), hickory (*Carya* sp.), maple (*Acer* sp.), poplar (*Populus* sp.), and oak accounting for 87% of roost trees documented. Nine roost trees are known from summer habitat in West Virginia (Beverly and Gumbert 2004). Eight of these were in snags, and one was in a live-damaged tree. At least four species were used as roost trees, including basswood, sugar maple, northern red oak, and scarlet oak (*Quercus coccinea*). On average, Indiana bats switch roosts every two to three days and may come back to roost trees periodically. Roost switching is likely dependent on many factors such as reproductive conditions, roost type, roost condition, time of year, and predation (Kurta et al. 2002; USFWS 2007). Primary roosts were initially defined by Callahan (1993) in terms of number (used by >30 bats) but are also defined by number of bat-days over one maternity season (Kurta et al. 1996; Callahan et al. 1997; USFWS 2007). Primary roosts are used throughout the summer, whereas alternate roosts are used less frequently and may be important in changing weather conditions (temperature and precipitation) or when the primary roost becomes unusable (Callahan et al. 1997). Primary roosts are often found near clearings or edges of woodland where they receive greater solar radiation, a factor that may be important in reducing thermoregulatory costs for reproductive females and their young (Vonhof and Barclay 1996). Female Indiana bats are able to use torpor to conserve energy during cold temperatures; however, torpor slows gestation (Racey 1973), milk production (Wilde et al. 1999), and juvenile growth and could be costly when the reproductive season is short (Barclay and Kurta 2007). Most maternity roosts have been located at low elevation where temperature and growing season tend to be more favorable for rearing pups, but one maternity colony has been reported from an elevation of 3,800 ft (1,158 m) in the Nantahala National Forest of North Carolina (Britzke et al. 2003). While the primary roost of a colony may move over the years, it is thought that foraging areas and commuting paths are relatively stable (Barclay and Kurta 2007). For example, some members of a colony in Michigan used a wooded fenceline as a commuting corridor for nine years (Winhold et al. 2005).

In the summer, Indiana bats predominantly roost under slabs of exfoliating bark. They do not commonly use tree cavities, such as those created by rot or woodpeckers, but will occasionally use narrow cracks in trees (Kurta 2004). Roosts are usually located in dead trees, though partly dead or live trees (if the species has naturally peeling bark) may also be used (USFWS 2007). Roost trees vary in size, the smallest recorded being 4 inches (11 cm) diameter at breast height (DBH) for a female roost (Britkze 2003), though most maternity roost trees are greater than 9 inches (22 cm) DBH (Kurta 2004). The mean DBH of roost trees (n = 359) in 12 states was 18±1 inches (45±2 cm) (range 15 to 24 inches [37 to 62 cm]) (Kurta 2004; Britzke et al. 2006). The DBH range of maternity roost trees in West Virginia was 5.3 to 13.0 inches (13.6 to 33.0 cm) DBH (Beverly and Gumbert 2004). Absolute height of the roost tree appears to be less important than the height of the tree relative to surrounding trees, with roost trees often extending above the surrounding canopy (Kurta 2004).

The USFWS defines suitable summer roosting habitat for the Indiana bat as forest containing trees ≥5 inches (12.7 cm) DBH with useable bark (USFWS 2009). Suitable roost trees are likely to continue to form, as well as be lost, as a result of common land use practices such as timber thinning, as well as natural causes (trees aging and snags being created by disease, fire, and/or ice storms).

Indiana bat maternity roosts are often found near clearings or edges of woodland where they receive extensive solar radiation (Menzel et al. 2001). Solar radiation helps to warm the roost and increase the rate of development of young bats (Racey 1982).

Indiana bat maternity colonies appear to show fidelity to a general home range within and between years (Sparks et al. 2004). The distance from the roost to foraging areas may be constrained by the need to return periodically once the young are born (Henry et al. 2002), since lactating females return to the roost two to four times during the night (Butchkoski and Hassinger 2002a; Murray and Kurta 2004). In general, the distance from the roost to foraging areas varies from 0.3 to 5.3 miles (0.5 to 8.4 km) (USFWS 2007). In Michigan, the mean distance from the roost to the nearest edge of an activity center was 1.5 miles (2.4 km) (0.3 to 2.6 mi) [0.5 to 4.2 km]) (Murray and Kurta 2004). Eleven females in Indiana used foraging areas on average 1.9 miles (3.0 km) (0.5 to 5.3 miles [0.8 to 8.4 km]) from their roosts (Sparks et al. 2005), and in Pennsylvania this distance was on average 2.1 miles (3.4 km) (1.5 to 2.8 miles [2.4 to 4.5 km]) (Butchkoski and Turner 2005). Due to the differences in methodology, it is difficult to determine the home ranges of female Indiana bats during the summer (Lacki et al. 2007).

Menzel et al. (2005) found no difference between home ranges of male and female bats between May and August in Illinois. Mean home range of the eleven bats in the study was 0.56 mi^2 (145 ha). The mean home range size of 24 females on the Vermont-New York state line was 0.32 mi^2 (83 ha) (Watrous et al. 2006). Both of these estimates are higher than for a single female in Pennsylvania where home range was estimated at 0.08 mi^2 (21 ha) (Butchkoski and Turner 2006). As well as differences in methodology, the range of home ranges estimated likely reflects differences in habitat quality among sites.

Less is known about the summer habitat of male Indiana bats, although Whitaker and Brack (2002) compiled records from Indiana over 20 years where there are summer records for males from 24 counties. These records suggest that during the summer many male Indiana bats remain in groups in or near the hibernacula. Groups of at least 19 to 40 male bats were caught in Wyandotte Cave in the summer (Whitaker and Brack 2002). Of 91 Indiana bats trapped in the vicinity of a Kentucky hibernaculum in the spring, summer, and fall, 77% were male. In addition, 93% of radio-tagged individuals that were relocated near the hibernacula during the summer were male, suggesting that males remained in the area longer than females (Gumbert et al. 2002). The bats roosted in 280 trees of 17 species, with oak, hickory, and pine species being the most commonly used. The mean DBH was 11.9 inches (30.3 cm) (range 2.5 to 30.0 inches [6.4 to 76.2 cm]), and 84% of the trees were dead (Gumbert et al. 2002). Long-term trapping in a church attic maternity roost has caught adult males within the roost; however, this may be more a consequence of its location within 1.6 miles (2.6 km) of the Hartman Mine hibernaculum rather than males following females to the roost (Butchkoski and Hassinger 2002b). Not all adult males remain at hibernacula during summer; most disperse away from the area, roosting in trees similar to those of female maternity roosts. Four adult males were radio-tracked in Indiana in counties without documented hibernacula. Estimated summer home ranges of these males was on average 0.6 mi^2 (152 ha) (range 0.2 to 1.5 mi^2 [58 to 400 ha]), with roost trees located in both bottomland forest and upland sites. Compared to female Indiana bats, males tend to roost alone and to use roost trees with a wider range of diameters, encompassing smaller diameter trees (Butchkoski and Hassinger 2002b; Gumbert 2001). This is likely due to the lower cost associated with male bats using torpor if the ambient temperature becomes too low (Barclay and Kurta 2007).

There are more data for summer and fall roost trees for male Indiana bats in West Virginia than for maternity roosts (Beverly and Gumbert 2004). As of 2004, there were 26 roosts located for males in West Virginia, including seven snags, eight live trees, and five live-damaged trees. Eleven tree species were used, including shagbark hickory (*Carya ovata*), sugar maple, American beech, white oak, tulip tree (*Liriodendron tulipfera*), black cherry, red maple (*Acer rubrum*), northern red oak, chestnut oak (*Q. montana*), white ash (*Fraxinus americana*), and red elm (*Ulmus rubra*), and the size ranged from 5.0 to 27.2 inches (12.7 to 69.1 cm) DBH (Beverly and Gumbert 2004). During September in West Virginia (the fall swarming period), male Indiana bats roosted on average within 3.5 miles (5.6 km) of the cave and in trees near ridgetops and often switched roost trees from day to day (C. Stihler, WVDNR, pers. comm.; USFWS 2007).

3.2.1.5 Demographics

Little is known about annual survival rates for Indiana bats, either in adults or juveniles, and little is known about background mortality of Indiana bats (USFWS 2007). It is expected that, similar to many other species, survival of Indiana bats is lowest during the first year of life (USFWS 2007). Threats and sources of mortality to Indiana bats vary during the annual cycle. During summer months, threats and sources of mortality may include loss or degradation of forested habitat, predation, human disturbance, and other man-made disturbances (Kurta et al. 2002; USFWS 2007). During winter months, impacts may include disturbance or modifications at the hibernacula and surrounding areas that physically disturb the bats or change microclimate condition in the hibernacula (USFWS 2007). Human disturbance may pose a threat during hibernation through direct mortality and disruption of normal hibernation patterns. Other sources of winter mortality may include natural predation, natural disasters that impact hibernacula, and more recently WNS, which impacts hibernating bats more than other perturbations.

In a study in Indiana, survival rates among male and female bats ranged from 66% to 76% for six to ten years after marking, with female lifespan approximately 12 to 15 years and males 14 years (Humphrey and Cope 1977). The oldest known Indiana bat was captured 20 years after the first capture (LaVal and LaVal 1980). Research from banding studies during the 1970s suggested that adult survival during the first six years varied from approximately 70% to 76% annually (Humphrey and Cope 1977; USFWS 2007; O'Shea et al. 2004; Boyles et al. 2007). After this period, annual survival varied from 36 to 66% percent and after 10 years dropped to approximately 4% (Humphrey and Cope 1977). The causes of the low survival (high mortality) rate after 10 years are not well understood, but it could simply be the relatively higher costs of migration, reproduction, and hibernation for older bats (USFWS 2007). There is less information available on juvenile (first-year) survival, with one published study suggesting a juvenile mortality rate of 8% based on observations at a maternity colony over a 2-year period (Humphrey et al. 1977). The USFWS has stated that more research is needed to define annual survival rates more accurately (USFWS 2007); however, available information suggests that annual mortality for Indiana bats is variable but likely between 8% and 30% during the first 10 years of life (USFWS 2007).

O'Shea et al. (2004) summarized survival rates for a number of species, including little brown bat, which is used as a comparable surrogate for the analysis in this HCP. The range of survival rates reported varied considerably from approximately 13% to 86% (see O'Shea et al. 2004). Other *Myotis* species also had variable survival rates. The overall range of survival rates for studies reporting on *Myotis* species ranged from approximately 6% to 89% (see O'Shea et al. 2004). Consistent results among studies indicated that first-year survival was generally the lowest, with adult survival higher.

As with mortality, little is known about recruitment rates in Indiana bat populations. Female Indiana bats typically give birth to one young each year (Mumford and Calvert 1960; Humphrey et al. 1977; Thomson 1982). The proportion of females in a population that produce young in a year is not well understood, but it is thought to be fairly high (USFWS 2007). In one study, greater than 90% of the females produced young each year (Humphrey et al. 1977), and in another it was estimated that 89% of adult females were reproductively active annually (Kurta and Rice 2002). Location and environmental factors are believed to influence reproductive rate (USFWS 2007), and there is concern that environmental stressors such as WNS may lead to lower reproduction rates (USFWS 2010b). Recruitment in the total Indiana bat population over the past 5-year period has been variable by region with the Ozark-Central, Midwest, and Northeast recovery units, showing decreasing trends in the overall population of approximately 5% to 38% between 2007 and 2009 (USFWS 2010c). Recruitment in the Appalachian Mountain Indiana bat population over the past 5-year period has exhibited an increasing trend and a net increase of 23% in the 2-year period between 2007 and 2009 (USFWS 2010c). Within West Virginia, there was a 0.7% increase in estimated wintering population of Indiana bats between 2007 and 2009 (USFWS 2010c).

3.2.1.6 Range and Distribution

The range of Indiana bat extends throughout much of the eastern U.S. and includes 22 different states (Gardner and Cook 2002; USFWS 2007) (Figure 3.1). Over the past 40 years, general

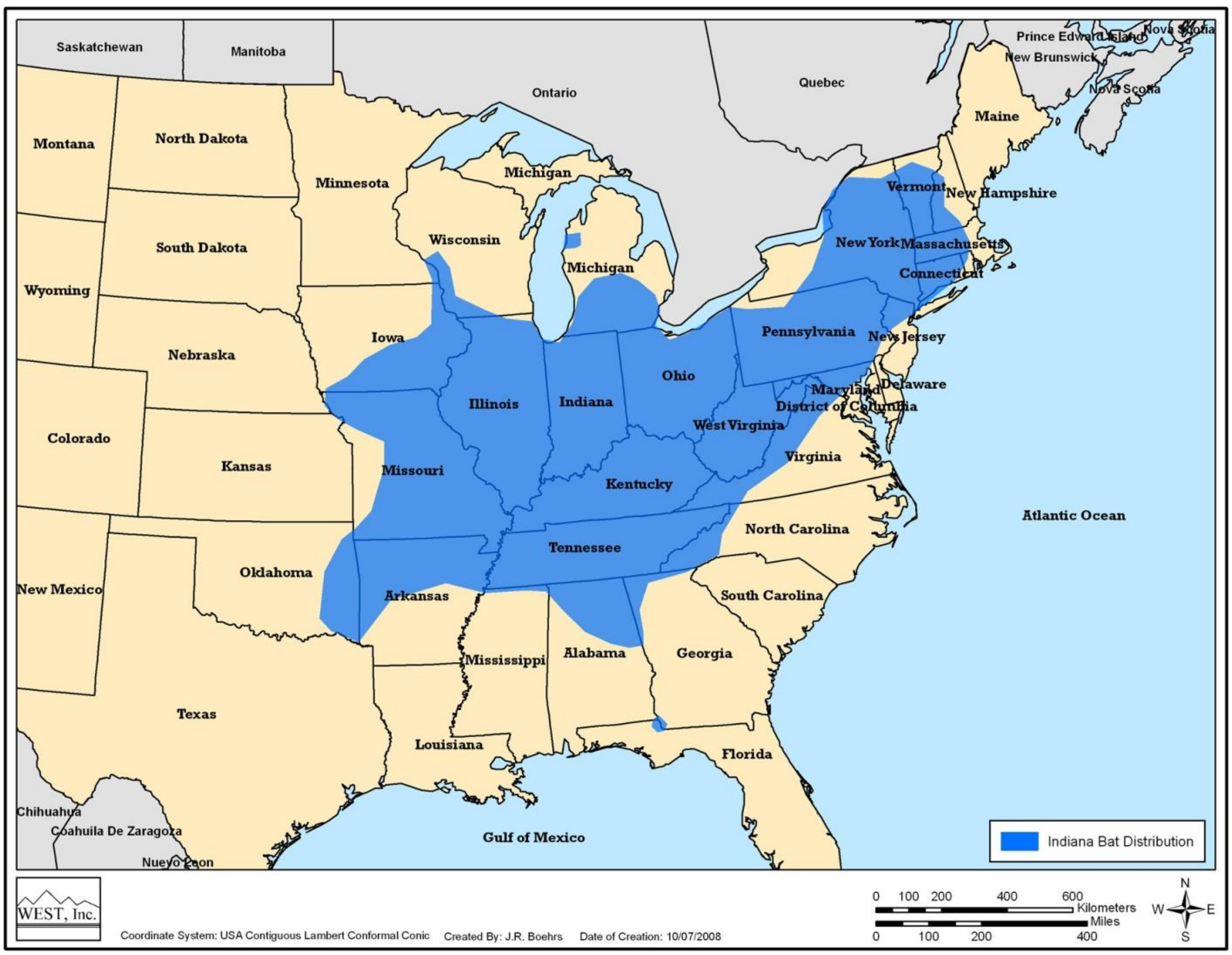

Figure 3.1 Approximate Indiana Bat Range in the U.S.

population trends indicate that Indiana bat populations appear to be decreasing in the southern regions and increasing in the northern regions of its range (USFWS 2007, 2010c). Historically, Indiana bat winter range was restricted to areas of cavernous limestone in the karst regions of the east-central U.S., apparently concentrated at a relatively small number of large complex cave systems. These included Wyandotte Cave in Indiana; Bat, Coach, and Mammoth caves in Kentucky; Great Scott Cave in Missouri; and Rocky Hollow Cave in Virginia (USFWS 2007).

More recently, however, increasingly greater numbers of Indiana bats have begun using man-made structures such as mines and tunnels, as well as natural caves, for hibernation, thus extending their winter range into some caveless parts of the country (Kurta and Teramino 1994). For example, several man-made tunnels in Pennsylvania have held hibernating Indiana bats (USFWS 2007), and in late 1993, an Indiana bat was discovered hibernating in a hydroelectric dam in Manistee County, Michigan (Kurta and Teramino 1994; Kurta et al. 1997). This dam was 281 miles (452 km) from the closest recorded hibernaculum for Indiana bat in LaSalle County, Illinois. In 2005, approximately 30% of the population hibernated in man-made structures (predominantly mines), while the other 70% used natural caves (USFWS 2007). As of November 2006, there were 281 known extant Indiana bat hibernacula in 19 states (USFWS 2007). However, over 90% of the estimated range-wide population was hibernating in just five states: Indiana (45.2%), Missouri (14.2%), Kentucky (13.6%), Illinois (9.7%), and New York (9.1%). Of these, 71.6% was hibernating in just 10 caves. Over all, approximately 82% of the estimated total population in 2006 hibernated in 22 of the 23 Priority 1 hibernacula (USFWS 2007).

Little is known about the historic summer range of Indiana bat. It is believed that the historical summer distribution was similar to that of today; however, the first maternity colony was not discovered until 1971 (Cope et al. 1974). As of October 2006, the USFWS had records of 269 maternity colonies in 16 states. This likely represents only 6-9% of the 2,859 to 4,574 colonies thought to exist based on the estimated total wintering population size (Whitaker and Brack 2002; USFWS 2007). The distribution of Indiana bat summer habitat (maternity colonies) in the east appears to be less extensive than in the Midwest (see range maps in USFWS [2007]). This may be due to the geographic distribution of important hibernacula or due to differences in climate and elevation that may limit suitable summer colony sites. Summers at increasing elevation are typically cooler or wetter, which may influence the energetic feasibility of reproduction in some eastern areas (Brack et al. 2002). Brack et al. (2002) examined the effect of elevation on the abundance of breeding female bats in West Virginia, Virginia, and Pennsylvania and concluded that the proportion of reproductively active bats decreased with increasing elevation. Portions of Indiana bat range in West Virginia, Virginia, and Pennsylvania are slightly cooler in summer than temperatures in the core part of the range in Indiana, Kentucky, and Missouri, and there is a 44°F (6.4°C) decrease in temperature for each increase of 3,280 ft (1,000 m) in elevation (Brack et al. 2002; Woodward and Hoffman 1991).

3.2.1.7 Dispersal and Migration

Based on categories described by Fleming and Eby (2005), species can be divided into three movement categories: (1) sedentary species that breed and hibernate in the same local areas, usually moving less than 30 miles (50 km) between summer and winter roosts; (2) regional migrants that migrate moderate distances between 60 to 310 miles (100 to 500 km); and (3) long-distance migrants that have highly developed migratory behavior, sometimes traveling greater than 620 miles (1,000 km) between summer and winter roosts. Dispersal distance of Indiana bats from winter hibernacula to summer roost sites varies geographically and categorizes them between sedentary and regional migrant depending on location. In Michigan, 12 female Indiana bats moved on average of 296 miles (477 km) to their hibernacula in Indiana and Kentucky (Winhold and Kurta 2006). In contrast, based on tracking of 82 tagged Indiana bats in New York, dispersal movements were typically less than 35 miles (60 km) and in many cases only a few miles/km from the hibernacula (Hicks 2007). In general, based on results of studies to date, summer range of Indiana bats could be any suitable habitat within approximately 350 miles (560 km) of known winter hibernacula.

Little is known about behavior of Indiana bats during migration. Evidence from radio-tracking studies in New York and Pennsylvania indicates that Indiana bats are capable of moving at least 30 to 40 miles (48 to 64 km) in one night (Sanders et al. 2001; Hicks 2004; Butchkoski and Turner 2006). It appears as if Indiana bat migration from hibernacula to summer habitat is fairly linear and short-term but in the fall is more dispersed and varied (USFWS 2007). Some studies have shown that Indiana bats may travel between 9 and 17 miles (14 and 27 km) in a night from a roost site to a hibernaculum cave where swarming is occurring (Hicks 2004, 2007; Sanders et al. 2001; Parsons et al. 2003; Hawkins et al. 2005). Males and females appear to display different migration behavior. Females appear to move quickly between the hibernacula and maternity colonies, while males commonly remain near the hibernacula (USFWS 2007).

3.2.1.8 Species Status and Occurrence

Nationwide. A key component to the survival and recovery of Indiana bat is maintenance of suitable hibernacula that ensures the over-winter survival of sufficient individuals to maintain population viability. The 2007 *Indiana Bat Draft Recovery Plan: First Revision* (USFWS 2007) categorizes hibernacula into four groups based on the priority to the species population and distribution. Priority 1 hibernacula are essential to the recovery and long-term conservation of the Indiana bat. These sites have a current or historically observed winter population of ≥10,000 individuals. Priority 2 hibernacula contribute to the recovery and long-term conservation of the Indiana bat. These sites have a current or historical population of >1,000 but <10,000 individuals. Priority 3 sites have a current or historical population of 50-1,000 bats, and Priority 4 sites have a current or historical population of fewer than 50 bats.

Since the release of the first Indiana Bat Recovery Plan in 1983 (USFWS 1983), the USFWS has implemented a biennial monitoring program at Priority 1 and 2 hibernacula in an effort to monitor the overall Indiana bat population (USFWS 2007). In 1965, the overall Indiana bat population was estimated at over 880,000 individuals. While variation in the data collection apparently has led to variable estimates, in general, the USFWS has reported a long-term declining population trend to about 380,000 individuals in 2001. Since that time, the population has shown increases to a 2007 estimate of approximately 468,000 (USFWS 2008a). According to the *Indiana Bat Draft Recovery Plan: First Revision* (USFWS 2007), the 2005 population estimate of Indiana bats was 457,608 individuals. The species population estimates for 2007 and

2009 were 468,184 and 387,385, respectively, which represents a 17.2% decrease since 2007 (USFWS 2010c).

General patterns in the overall estimates have been a decreasing trend through the core of the species range, with increasing trends on the periphery and more northern states (USFWS 2007). The causes of the population changes are unknown, but climate change is believed to play a role in that it may affect hibernacula temperature (USFWS 2007). The core of the species range is primarily in the Midwestern states of Indiana, Kentucky, Illinois, and Missouri where greater than 82% of the Indiana bat population winters. Almost half (45.2%) of the estimated range-wide population hibernated in Indiana, with significant portions hibernating in Missouri (14.2%), Kentucky (13.6%), Illinois (9.7%), and New York (9.1%).

More recently, Indiana bat populations in the northeastern and eastern U.S. have been affected by WNS, which is resulting in local and regional population changes. WNS is a poorly understood ailment related to the death of thousands of bats in the northeastern U.S. Annual declines in the number of bats at infected hibernacula have ranged from 30 to 99%, with a mean decline of 73% in the northeastern U.S. (Frick et al. 2010). The condition is named for a distinctive white fungal (*Geomyces destructans*) growth around the muzzles and on the wings of affected animals.[9] WNS was first identified in caves near Albany, New York, in 2006; had spread to Vermont, Massachusetts, and Connecticut by 2008; spread more recently to New Jersey, Pennsylvania, Virginia, and West Virginia in 2009; and spread to Maryland, Tennessee, Missouri, Oklahoma, and Canada by May 2010 and to Indiana by February 2011 (Pennsylvania Game Commission 2011). It is unknown if the fungal growth is a causative agent in the bat deaths or an opportunistic infection invading due to lowered immune response or other reasons. Loss of winter fat stores, pneumonia, and the disruption of hibernation and attempted winter feeding cycles are associated with the death of infected bats. The disease has resulted in mortality rates exceeding 90% over two years for certain infected caves. These population declines in certain caves and the rapid spread of WNS have raised concerns about the impact of the disease on the population viability (Frick et al. 2010).

Appalachian Mountain Recovery Unit. The *Indiana Bat Draft Recovery Plan: First Revision* divides the species range into four recovery units based on several factors such as traditional taxonomic studies, banding returns, and genetic variation (USFWS 2007). The Project falls within the Appalachian Mountain Recovery Unit, which includes the range of Indiana bat within the states of Pennsylvania, Maryland, Virginia, West Virginia, North Carolina, and the far eastern tier of Tennessee. According to the *Indiana Bat Draft Recovery Plan: First Revision* (USFWS 2007), the 2007 rangewide population estimate (USFWS 2008a), and the 2009 rangewide population estimate (USFWS 2010c), the overall Indiana bat population in the Appalachian Mountain Recovery Unit was approximately 22,483 in 2007 and 27,675 in 2009 (Table 3.1). This represents approximately 7.1% of the overall 2009 population estimate of Indiana bats (USFWS 2010c). The overall population estimate for the Appalachian Mountain Recovery Unit increased by approximately 23.2% between 2007 and 2009 (Table 3.1) (USFWS 2010c). Within the Appalachian Mountain Recovery Unit, approximately 55% of the Indiana bats hibernate in West Virginia (Table 3.1).

[9] http://www.fws.gov/WhiteNoseSyndrome/

Table 3.1 Indiana Bat Population Estimates for the Appalachian Mountain Recovery Unit (USFWS 2010c).

State	2001	2003	2005	2007	2009
Pennsylvania	702	931	835	1038	1031
Maryland[1]	nd	nd	nd	Nd	nd
West Virginia	9,714	11,444	13,417	14,745	14,855
Virginia[2]	969	1,158	769	723	730
North Carolina	0	0	0	0	1
East Tennessee	5,372	6,556	8,853	5,977	11,058
Total	16,757	20,089	22,874	22,483	27,675

[1]no data reported for Maryland in USFWS (2008a, 2010c).
[2] page 1 of USFWS (2010c).

There are 88 known Indiana bat hibernacula in the Appalachian Mountain Recovery Unit, 55 have extant winter populations (at least one record since 1995) (USFWS 2007). There are two Priority 1 hibernacula in the recovery unit—Hellhole Cave (WV) and White Oak Blowhole (TN), both of which are designated Critical Habitat for Indiana bats. These two Priority 1 hibernacula had estimated populations of 12,858 and 5,481 Indiana bats, respectively, in 2007 (USFWS 2009), and they had 14,855 and 11,058 Indiana bats, respectively, in 2009, which represent approximately 96% of the total number of Indiana bats in the Appalachian Mountain Recovery Unit.

West Virginia. In 2007, approximately 3.1% of the estimated range-wide population of Indiana bats hibernated in West Virginia (USFWS 2008a). This increased to approximately 3.8% in 2009 (USFWS 2010c). Numbers of Indiana bats in West Virginia have steadily increased since 2001 to a recent population estimate of approximately 14,855 individuals (Table 3.1) (USFWS 2010c). There are 37 known Indiana bat hibernacula in the state, and of these, 27 have extant winter populations (at least one record since 1995) (USFWS 2007). Of the West Virginia hibernacula, one hibernacula is classified as Priority 1 (≥10,000), one as Priority 2 (1,000-9,999), 11 as Priority 3 (50-999), and 22 as Priority 4 (1-49), and two are unclassified (USFWS 2007). Thirteen of the Priority 4 hibernacula are considered extinct or had a maximum population size of zero since 2000 (USFWS 2007). The Priority 1 hibernaculum, Hellhole Cave, is located in Pendleton County in the east-central part of the state. The 2007 estimate for this hibernaculum was 12,858 individuals (UWFWS 2009).

All of the hibernacula in West Virginia are found in the eastern part of the state in the Appalachian Mountains, Central Appalachian Broadleaf Forest Ecoregion (USFWS 2007). All of West Virginia is located in the Appalachian Mountain Recovery Unit for Indiana bat (USFWS 2007).

As of the 2007 *Indiana Bat Draft Recovery Plan: First Revision* (USFWS 2007), only three maternity colonies, located in Boone and Tucker counties, were recorded for the state. Since 2007, a fourth maternity colony has been located in Ohio County. This is believed to represent a small portion of maternity colonies due to the limited nature of surveys for maternity colonies (C. Stihler, WVDNR, pers. comm.). Tucker County has three known hibernacula, while Boone and Ohio counties have no known hibernacula (USFWS 2007). Six counties (Clay, Nicholas, Pendleton, Raleigh, Randolph, and Tucker) have summer records of Indiana bats other than reproductive females or maternity colonies.

Indiana bat maternity colonies have been located in mountainous terrain that has significant changes in elevation and substantial percent forest cover (Butchoski and Hassinger 2002b; Britzke et al. 2003). To achieve maximum solar radiation in a mountainous environment, roost trees usually are located on upper slopes and ridges. For instance, four known maternity colonies in West Virginia are located on ridges and upper slopes (above 984 feet [300 m] in elevation). In Tucker County, West Virginia, a maternity colony was found roosting in direct sunlight at an elevation of 3,001 feet (915 m) (Sanders Environmental, Inc. 2004). In the mountainous areas of western North Carolina, a maternity colony was found roosting in direct sunlight at an elevation of 3,798 feet (1,158 m) (Britzke et al. 2003). Within the closely spaced ridges of the Appalachian Mountains, suitable microclimates with adequate solar radiation and tree structure are found at a wide variety of elevations and aspects.

At an Indiana bat maternity site near a mine in a mountainous area of Boone County, West Virginia, the only habitat available to these bats was forest with steep ravines, cool valley streams, and associated dirt roads (Beverly et al. 2009). Reproductive Indiana bats equipped with radio-transmitters foraged within a steep ravine containing a headwater stream between upper and mid slopes (in contrast to other studies where bats forage in riparian areas). Heavy fog and cool temperatures that settle in valleys associated with mountain streams may explain why these bats consistently foraged higher up the slope. In addition, the ravine provided shelter from strong winds typical of the ridge tops. Thus foraging ravines may provide ideal conditions for both bat and insect prey (Beverly et al. 2009).

3.2.1.9 Project Site/Local Population

On-site Survey Results. Existing site-specific surveys and other information suggest that the occurrence and abundance of Indiana bats in the Project area is quite low and likely variable over the migration season. Based on the available scientific information, results of site-specific surveys, and distance to the nearest known hibernacula, Indiana bats may occupy the Project area from approximately April 1 through November 15 (USFWS 2007; C. Stihler, WVDNR, pers. comm.; Young and Gruver 2011). The following section provides a summary of results of studies conducted to evaluate Indiana bat use of the project area.

During pre-Project studies, BHE (2006a) conducted an extensive literature/information review, interviewed experts, investigated agency and university records, and conducted field surveys of caves in and within 5 miles (8 km) of the Beech Ridge site. A leading local cave authority, Bill Balfour, was also consulted regarding potential caves within or near the site. Results of these studies found no caves or potential hibernacula within 5 miles (8 km) of the Beech Ridge site (BHE 2006a).

The USFWS recommends completing mist-net surveys during the summer maternity season to detect Indiana bats that may be roosting and raising pups in the survey area (USFWS 2007). However, mist-netting at other times of year has value in determining presence or probable absence. BRE conducted mist-netting surveys in July 2005, May 2006, July 2010, and September 2010 to capture any summering, migrating, or swarming Indiana bats that may use the project area. A network of mist-nets was deployed at sites thought to have a high likelihood of capturing Indiana bats for multiple nights. Although capture of bats confirms their presence, failure to catch bats does not absolutely confirm their absence, and mist-netting may be repeated at 5-year intervals to confirm probable absence if the expansion turbines are not constructed within 5 years of the 2010 field studies.

On-site surveys during the pre-project development period, conducted from July 2005 to May 2006, did not detect any Indiana bats on-site through mist-netting at 15 locations in the approximate development areas for turbines and 12 sites along the transmission line route (BHE 2005, 2006b). On-site surveys conducted in July and September 2010 also did not detect any Indiana bats through mist-netting at eight locations within the existing 67-turbine phase and six locations within the proposed 33-turbine expansion phase (Sanders Environmental, Inc. 2010a, 2010b). As explained above, these mist netting locations and surveys were developed in consultation with USFWS (Carter 2010).

In addition to the on-site mist netting described above, acoustic data were collected during mist-netting in 2005 and 2010. The 2005 data were analyzed by plaintiffs in the BRE litigation, and they concluded that 0 to 8 potential Indiana bat calls could be identified in the data files depending on the analytical method used and the threshold number of pulses used to identify the sequence to a species.

BRE conducted analysis of the 2010 acoustic data collected using Anabat™ SD1 detectors (Titley Scientific, Australia) between July 21 and November 23, 2010 (Young and Gruver 2011). The analysis employed a multi-level strategy to identify potential Indiana bat echolocation calls. The approach consisted of two quantitative screens and one qualitative screen. Quantitative screens included a call analysis filter and a multivariate statistical model developed from a set of known calls. In addition, calls were examined qualitatively by Western EcoSystems Technology, Inc.’s Indiana bat biologist, Dr. Kevin Murray. Details and further discussion of the methods for the quantitative and qualitative screening are reported in Young and Gruver (2011).

Of the 12,431 files examined for potential Indiana bat calls, six were identified by two screening tools and one was identified by all three screening tools (Table 3.2) as potential Indiana bat calls. Three of the files were recorded on the same night (July 28, 2010), and of those, two were from the same station (3559 located at ground level). The only file identified by all three screening tools as a potential Indiana bat call was recorded at station 3559 on the night of July 29.

Table 3.2 Summary of 2010 Echolocation Passes Identified as Potential Indiana Bat Calls by Two or More Screening Tools.

			Screening Tool		
Acoustic Monitoring Station	Location Description	Date	Britzke Filter	Discriminant Function Analysis	Visual Inspection by Dr. Murray
3559	Mist-net site	7/28/2010		X	X
3559	Mist-net site	7/28/2010	X		X
3559	Mist-net site	7/29/2010	X	X	
3559	Mist-net site	7/30/2010	X	X	X
4141	Mist-net site	7/29/2010	X		X
A17g	Turbine A17, ground level	7/28/2010	X		X
A17g	Turbine A17, ground level	8/5/2010	X		X

Results of the 2010 acoustic data analysis suggest that Indiana bats were potentially recorded on-site but in very low numbers. Given the very low number of potentially recorded calls relative to the overall number of recorded calls (6 out of 12,431, or 0.04%) and the fact that acoustic analyses do not provide 100% positive identifications, it is possible that no Indiana bats were in fact recorded during the acoustic survey (i.e., detections were false positives). Furthermore, none of the potential Indiana bat calls (selected by two or more screens) were recorded at the two detectors mounted on turbine nacelles; all were recorded at ground level where fatalities with operating rotors would not occur.

Spring Dispersal and Fall Mating/Swarming/Migration Seasons. Based upon the results of on-site surveys conducted over multiple years, Indiana bat occurrence in the Project area is expected to be a rare or unlikely event. However, some Indiana bats emerging in the spring, and bats moving back to the caves in the fall could traverse through the Project area during the term of the ITP[10].

Information from West Virginia is limited, but four Indiana bats have been documented traveling between 30 and 100 miles (48 and 160 km) from summer locations in Pennsylvania to hibernacula in Randolph, Pendleton, and Tucker counties (C. Stihler, WVDNR, pers. comm.). Two other Indiana bats have been documented traveling up to 64 miles (102 km) from a hibernaculum in Pennsylvania to a maternity site in Ohio County, West Virginia (C. Butchkoski, Pennsylvania Game Commission, pers. comm.).

Due to the locations of Snedegar and Martha caves, as well as the location of the project adjacent to karst geology in West Virginia (BHE 2006a), it is possible that Indiana bats emerging in the spring could traverse through the Project area during the April-May time frame over the term of the ITP (spring emergence). The primary direction of travel for emerging bats from these caves

[10] For the purposes of estimating take of Indiana bats (see Section 4.0), this HCP assumes that the Project area is or will be used by Indiana bats at times.

is unknown, but given the distribution of summer maternity records for Indiana bats in the region (USFWS 2007), it is possible that some dispersing Indiana bats could travel through the Project area during the term of the ITP enroute to summer maternity areas. From limited tag returns, Indiana bat movement in West Virginia appears to be possible in all directions (C. Stihler, WVDNR, pers. comm.).

Indiana bats may move considerable distances during the fall season (USFWS 2007). During the fall period, Indiana bats, and in particular males, are not necessarily associated with only one cave and may travel between caves, presumably in search of mates. In West Virginia, one male was observed traveling up to 23 miles (37 km) between caves in different years, and one bat that was captured during the swarming period in Pennsylvania was found in Hellhole Cave over 100 miles (160 km) away in a subsequent winter (C. Stihler, WVDNR, pers. comm.).

Indiana bats returning to Snedegar and Martha caves in the fall could traverse through the Project area in late-August and September (post-maternity/pup-rearing season) or could potentially occur in the Project area during the fall swarming period. By late September, available information indicates that Indiana bats associated with these caves will likely have returned to the cave for the mating season, and by November 1, most bats will have either entered the cave or have become closely associated with the cave for the on-set of hibernation. Depending on weather conditions, Indiana bats could be active outside the caves until approximately November 15 but in decreasing numbers.

Indiana bats have been documented moving up to 19 miles (30 km) in a night during the late summer mating/swarming season; however, most Indiana bats appear to roost within 1-2 miles (1-3 km) of the hibernaculum and particularly for small (Priority 3) hibernacula during this season (USFWS 2007). While it is unknown if the size of the hibernating population influences the swarming behavior (USFWS 2007), competition for prey resources at large hibernacula may force bats to travel farther and roost farther from the caves (USFWS 2007). The Project is between 9.3 and 12.9 miles (14.9 and 20.6 km) from Snedegar and Martha's caves, respectively, and thus is at the edge of potential swarming area Snedegar Cave. As these caves maintain relatively small numbers of Indiana bats (<600), bats are unlikely to travel far from the caves during the swarming based on the information provided in the *Indiana Bat Draft Recovery Plan: First Revision* (USFWS 2007). In addition, the Project is not located between known Indiana bat hibernacula that decreases the likelihood of Indiana bats flying through the project if they are traveling to another hibernacula.

<u>Winter Season</u>. No Indiana bats are likely to occur in the Project area from November 15 through March 31 when they are hibernating. There are no known caves within the Project area that support hibernating Indiana bats.

Snedegar Cave and Martha Cave have extant wintering populations with estimates of 110 to 304 and 145 to 285 (since 1993), respectively, based on complete counts of located clusters, suggesting relatively low local numbers of Indiana bats. Counts from the winter 2010-2011 were similar to the historic data with 179 Indiana bats in Snedegar cave and 176 in Martha Cave (C. Stihler, WVDNR, 2011, pers. comm.). Snedegar Cave is approximately 9.3 miles (14.9 km) and Martha Cave is approximately 12.9 miles (20.6 km) from the eastern edge of the Project area

(BHE 2006a). The *Indiana Bat Draft Recovery Plan: Revision 1* (USFWS 2007) reports an additional 94 Indiana bats in caves in Greenbrier and Pocahontas counties, which occur within roughly a 30-mile (48-km) radius of Beech Ridge.[11]

Three other Priority 4 caves historically used by low numbers of Indiana bats occur within 10 miles (16 km) of the project area: Bob Gee (3 to 4 miles [5 to 6 km]), Higginbotham (10 miles [16 km]), and McFerren (10 miles [16 km]). Lobelia/Salt Peter cave (also Priority 4) is within 10 to 11 miles (16 to 17 km) of the nearest turbine and is considered an "extant" hibernacula in the recovery plan (USFWS 2007), with a maximum of four Indiana bats recorded but none seen since 2000. None of these caves have been recently surveyed, but Indiana bat use of these caves has historically been low.

<u>Summer Maternity/Pup-rearing Season</u>. In the summer, Indiana bats predominantly roost under slabs of exfoliating bark or cracks in trees (Kurta 2004; USFWS 2007). An important characteristic for the location of maternity roost sites is a mosaic of woodland and open areas, with the majority of maternity colonies having been found in agricultural areas with fragmented forests (USFWS 2007). Primary roosts are often found near clearings or edges of woodland where they receive greater solar radiation, a factor that may be important in reducing thermoregulatory costs for reproductive females and their young (Vonhof and Barclay 1996; Callahan et al. 1997). Cool summer temperatures that require female Indiana bats to use torpor to conserve energy will slow reproductive functions (gestation, milk production, juvenile growth) and could be costly when the reproductive season is short (Racey 1973; Wilde et al. 1999; Barclay and Kurta 2007). Due to these factors, maternity colonies are typically located in lower elevation areas that have higher summer temperatures for longer periods.

Due to the elevation of the Project area of approximately 3,650 ft (1,112 m) and the typically cooler summertime temperatures, it is unlikely that Indiana bats will occur in the Project area during the summer (C. Stihler, WVDNR, pers. comm.). Surveys during the pre-Project development period, conducted from July 2005 to May 2006, did not detect any Indiana bats on-site through mist-netting at 15 locations in the approximate development areas for turbines and 12 sites along the transmission line route (BHE 2005, 2006b). On-site surveys conducted in July and September 2010 also did not detect any Indiana bats through mist-netting at eight locations within the existing 67-turbine phase area and six locations within the proposed 33-turbine expansion area (Sanders Environmental, Inc. 2010a, 2010b). As explained above, these mist netting locations and surveys were developed in consultation with USFWS (Carter 2010). A small number of potential Indiana bat calls were detected at ground level on July 24 and July 26, 2005, on July 28, 29, and 30, 2010, and on August 5, 2010 (Young and Gruver 2011). These dates correspond with the end of the summer breeding season and the beginning of the fall swarming/migration season. The presence of reproductive females, post-lactating females, or juveniles is unlikely based on the site's elevation and the lack of captures during mist-netting.

The scientific literature contains one study (Britzke et al. 2003) in which an Indiana bat maternity colony is located at high elevation; however, this site is at least 200 miles (322 km)[12]

[11] Portions of Webster, Nicholas, and Fayette counties also occur within a 30-mi (48-km) radius of the Project area; however, no Indiana bat caves are reported for these counties (USFWS 2007).

south of the Beech Ridge site where higher elevations are warmer. Consultations with WVDNR and peer reviews by multiple parties indicate that it is highly unlikely that a maternity colony occurs at the Beech Ridge site due to elevation. In the event that an Indiana bat maternity colony in fact does occur nearby at lower elevation, it is possible that female Indiana bats would utilize the ridges in the Project area for foraging; however, there are no direct data available to support the presence of such a colony, and the colony would have to occur within approximately 1.5 to 2.5 miles (2.4 to 4.0 km) of the ridge (J. Whitaker, University of Indiana, and Barb Douglas, USFWS, pers. comm.).

There are no known detections of Indiana bats in the area surrounding the Beech Ridge site during the summer breeding season, and no roost trees have been identified. Considering the predominant land use in much of this area is forest management, it is possible roost trees occur somewhere in the area; however, if they exist, such trees would be likely to occur off-site at lower elevations. Therefore, impacts to maternity colonies are not presently reasonably foreseeable, and risk at the site to female Indiana bats is currently limited to migrating females.

Less is known about the summer habitat of male Indiana bats. Summer records for males from Indiana and Kentucky suggest that many male Indiana bats remain in groups in or near the hibernacula during the summer (Whitaker and Brack 2002; Gumbert et al. 2002). While some males may occupy or periodically visit maternity colonies, the summer distribution of males is more widespread, and males can inhabit a larger range of environmental conditions (Butchkoski and Hassinger 2002b; Barclay and Kurta 2007). Compared to female Indiana bats, males tend to roost alone or in bachelor colonies and use a wider range of roost trees in terms of size and location (Butchkoski and Hassinger 2002b; Gumbert 2001). Due to these factors and the location of the Indiana bat hibernacula closest to the Project area, it is possible that some male Indiana bats could occur in the Project area during the summer months of June, July, and August during the term of the ITP[13].

www.fws.gov/nc-es/mammal/vbigear.html

3.2.2 Virginia Big-Eared Bat

Virginia big-eared bat is a subspecies of the Townsend's big-eared bat (*Corynorhinus townsendii*), a species common throughout the western U.S. Virginia big-eared bat was listed as endangered under the ESA in 1979. The Virginia big-eared bat recovery plan cites predation at some cave sites as a direct threat to Virginia big-eared bat, but the recovery plan states that there is too little information to determine if predation was a limiting factor for the species (Bagley 1984). Additional information about threats,

[12] Britzke et al. (2003) do not report the location of the maternity colony, but it was found in the Nantahala National Forest, the approximate center of which is 260 miles (480 km) straight-line distance from the center of the Project and approximately 200 miles (322 km) south.

[13] For the purposes of estimating take of Indiana bats (see Section 4.0), this HCP assumes that the Project area is or will be used by Indiana bats at times.

including human disturbance, vandalism, and loss of habitat, was suggested based on information about Townsend's big-eared bat (Bagley 1984). The Virginia big-eared bat five-year review (USFWS 2008b) included anthropogenic factors such as human disturbance, development, and vandalism as threats to the species.

3.2.2.1 Life History and Characteristics

Virginia big-eared bats are relatively long-lived and typically produce one young per year, life-history strategies that may be influenced by constraints on their ability to fly (Barclay and Harder 2005). During late March or early April, female Virginia big-eared bats congregate and form maternity colonies in the warmer parts of particular caves, where they give birth to one offspring per year (Dalton et al. 1986). The exact timing of the establishment of the maternity roost may vary among sites and be due, in part, to differences in thermal warming among caves (Lacki et al. 1994). At a maternity roost in Kentucky, females were pregnant in early May and were lactating by mid-June, and volant juveniles were present at the site in early August (Lacki et al. 1994). Female Ozark big-eared bats (*C. t. ingens*), another subspecies of Townsend's big-eared bat, vary their nightly activity depending on the age of the young, such that activity bouts were shorter when the young were fully dependent on the female and increased as the young began to forage and became more independent (Clark et al. 2002). A similar pattern of summer activity has been seen in Virginia big-eared bats (Bagley and Jacobs 1985). In one study, of the 26 males caught in mid-August, 77% had partially descended testes, suggesting the onset of mating at this time (Lacki et al. 1994).

3.2.2.2 Habitat Requirements

Virginia big-eared bats predominantly roost in caves, although individuals have been found in abandoned coal and hard rock mines in both the summer and during the winter. The species is generally sedentary and does not migrate far between summer and winter habitat (Bagley 1984; Johnson et al. 2005). Distinct caves or the same cave may be used by (1) males and females as hibernacula, (2) females as summer maternity colonies, and (3) males as summer bachelor colonies. For example, a cave within the Daniel Boone National Forest in Kentucky that served as a hibernaculum for 3,700 individuals also served as a bachelor roost for males in the summer (Adam et al. 1994). Three maternity colonies were known to occur within 1.4 miles (2.2 km) of this hibernaculum (Lacki et al. 1994). In West Virginia, the greatest distance between winter and summer roosts is 19.8 miles (31.9 km), and individuals from multiple summer roosts are known to winter in the same hibernaculum (Piaggio et al. 2009).

3.2.2.3 Winter Habitat

Caves utilized by Virginia big-eared bats are typically located in karst regions dominated by oak-hickory or beech-maple-hemlock associations (Barbour and Davis 1969; Bagley 1984). In West Virginia, Virginia big-eared bats hibernate in parts of the cave where temperatures are 54°F (12°C) or less but above freezing. There are no known records of winter activity by Virginia big-eared bats anywhere in West Virginia.

3.2.2.4 Summer Habitat

Both male and female Virginia big-eared bats have been found to forage in a range of habitats, including old fields and pastures, cliffs, and forest habitat (Dalton et al. 1986; Adam et al. 1994; Burford and Lacki 1995). However, the sexes utilize separate roost sites during the summer, possibly due to differences in energetic requirements at this time.

Two maternity roosts in Kentucky are located in limestone caves, with a third being located at the base of a cliff in a sandstone rockshelter (Lacki et al. 1994). In Virginia, maternity colonies are found in limestone caves (Dalton et al. 1986). Mean inside temperatures for two of the roosts were a minimum of 59 and 60ºF (14.8 and 15.8°C) and a maximum of 74 and 75ºF (23.3 and 23.8°C). During late March or early April, female Virginia big-eared bats congregate and form maternity colonies in the warm parts of certain caves. Females emerge shortly after dark to forage. During May and most of June, the bats remain outside of the cave for most of the night. By late June and July, a portion of the colony returns during the night and often re-emerges in a pattern that is probably related to the age and development of the young. Data from 13 female Virginia big-eared bats in the summer of 1991 and 1992 revealed foraging areas of on average 300 acres (122 ha) (range 32-570 acres [13-231 ha]) (Adam et al. 1994). Foraging areas became larger in August when offspring became volant, likely because females did not have to return to the roost between foraging bouts. The maximum distance a female was found from the maternity colony was 2.3 miles (3.7 km) (Adam et al. 1994).

There are varying accounts of summer roost requirement by male Virginia big-eared bats. Although it is suggested that males may remain solitary throughout the summer, data from Kentucky reveal that males may form large bachelor colonies (Lacki et al. 1994).

3.2.2.5 Demographics

There are few data on mortality rates of Virginia big-eared bats. Both the U.S. Forest Service and the WVDNR have noted examples of Virginia big-eared bats being struck by vehicles, and two dead individuals were found on the road near Minor Rexrode Cave (a hibernaculum) along Thorn Creek (USFWS 2008b). Information concerning mortality rates of Townsend's big-eared bat was used in the recovery plan due to lack of information specific to Virginia big-eared bat (Bagley 1984). Rates of Townsend's big-eared bat pre-weaning post-natal mortality was 5% in South Dakota and 4% in Kansas and Oklahoma (Kunz and Martin 1982). Survival rates of females (estimated by recording the number of yearling and adult females that returned to maternity colonies each year in a three-year period) was 70-80% for adults and 38-40% for yearlings. Of yearlings that survived the first year, 75% returned as two-year-olds and 80% returned as three-year-olds (Pearson et al. 1952). Most first-year mortality appeared to occur prior to hibernation. Longevity, based on banded bats in California, is 16 years and 5 months (Bagley 1984).

3.2.2.6 Range and Distribution

Virginia big-eared bat is found in a few isolated populations within northwest Virginia, northeast and south-central West Virginia, eastern Kentucky, and northwest North Carolina (Figure 3.2).

This subspecies is also isolated from the Ozark big-eared bat, another subspecies of Townsend's, with little or no possibility of gene flow between subspecies populations (Piaggio et al. 2009). In West Virginia, the greatest movement recorded between summer and winter roosts are 19.8 miles (31.9 km) (C. Stihler, unpublished data in Piaggio et al. [2009]). Based on this distance, an approximate range map was created to include a 20-mile (32-km) buffer around all counties within Kentucky, West Virginia, Virginia, and North Carolina with recent records of Virginia big-eared bat[14] (Figure 3.2). The distance between the geographic populations is outside of the known dispersal range of these bats; therefore, it is likely that there is little or no interbreeding among populations (Humphrey and Kunz 1976; Piaggio et al. 2009). Recent genetic studies, which include data from individuals in four of these populations (the North Carolina population was not included in the study), showed that they are significantly differentiated from each other and suggest a complete loss of connectivity among regional populations for females and between all but the northeastern and central West Virginia populations for males (Piaggio et al. 2009).

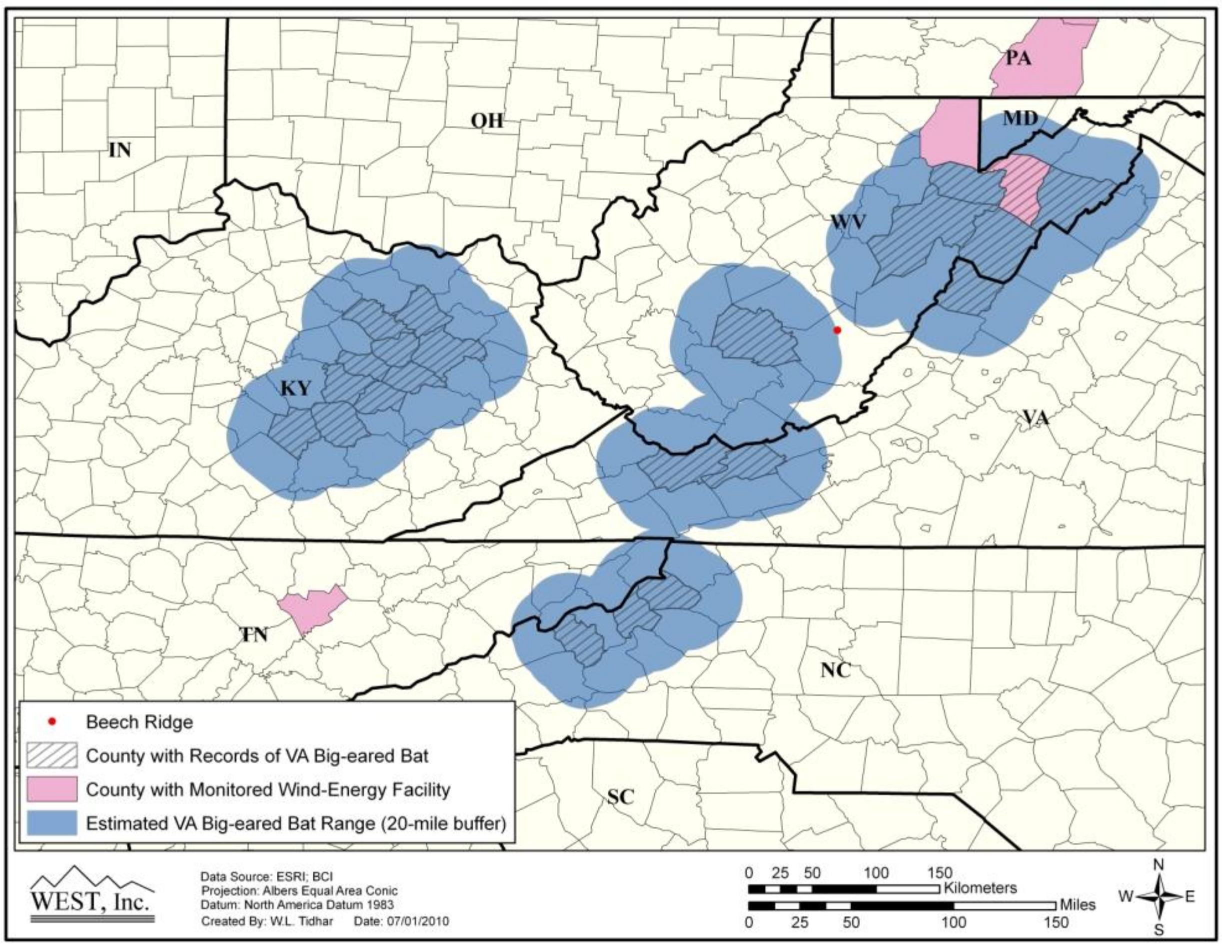

Figure 3.2 Approximate Virginia Big-Eared Bat Range.

[14] Records from state wildlife agency webpages, accessed July 2, 2010.

3.2.2.7 Dispersal and Migration

Virginia big-eared bats are generally sedentary and do not usually migrate far between summer and winter habitat (Bagley 1984; Johnson et al. 2005; Piaggio et al. 2009). Mark-recapture studies of Townsend's big-eared bat suggest that both sexes exhibit extreme philopatry to winter and summer roosts, suggesting that neither males nor females disperse (Humphrey and Kunz 1976). Recent genetic studies on Virginia big-eared bat appear to corroborate, suggesting that neither sex disperses or that in some cases only males disperse (Piaggio et al. 2009). The swarming behavior exhibited in the fall by cave-hibernating bats likely reduces the need for true dispersal, with males known to visit a number of caves at this time to breed. There is also some evidence that females may also visit bachelor colonies in the late summer/early fall (Stihler et al. 1997). The nearest known wintering cave for Virginia big-eared bats is in Fayette County approximately 30 miles (48 km) from the Project. Based on the generally short dispersal range of this species, it is unlikely that movements during swarming would overlap with the Project.

3.2.2.8 Species Status and Occurrence

A joint recovery plan was developed for Virginia big-eared bat and Ozark big-eared bat in 1984, and a five-year review was initiated for the species in January 2007 and released in the summer of 2008 (USFWS 2008b). Virginia big-eared bat is a subspecies of Townsend's big-eared bat, which is found throughout the western U.S. from the western seaboard east to the plains states from South Dakota south though Texas (Figure 3.3). There are no distinct recovery units identified for Virginia big-eared bat (USFWS 2008b).

Nationwide. State agency data show records for Virginia big-eared bat in 10 counties in Kentucky, three counties in North Carolina, three counties in Virginia, and six counties in West Virginia (Figure 3.2). Rangewide, the population of Virginia big-eared bats has increased from 1,300 to more than 13,000 (winter counts) since the bat's listing in 1979 (USFWS 2008b). Discovery of additional hibernacula and maternity colonies has also contributed to higher known population levels (U.S. Geological Survey 2006). A new summer colony numbering approximately 1,350 bats, making it the largest known for the species, was discovered in 1992 in West Virginia. In Virginia, Virginia big-eared bat is known to summer in three caves in Tazewell County and overwinter in five caves in Tazewell, Bland, and Highland counties.

West Virginia. Virginia big-eared bat hibernacula are known from nine caves in four counties in West Virginia: Tucker, Grant, Hardy, and Pendleton. These caves are censused approximately every two years (C. Stihler, WVDNR, pers. comm.). The estimated number of hibernating Virginia big-eared bats in West Virginia in 2010 was at least 11,092 (Table 3.3).

Known Virginia big-eared bat maternity colonies have been censused three times over the past four years (Table 3.4). Steady increases in numbers over the last few years for both summer and winter colonies have been observed at most West Virginia caves (C. Stihler, WVDNR, pers. comm.).

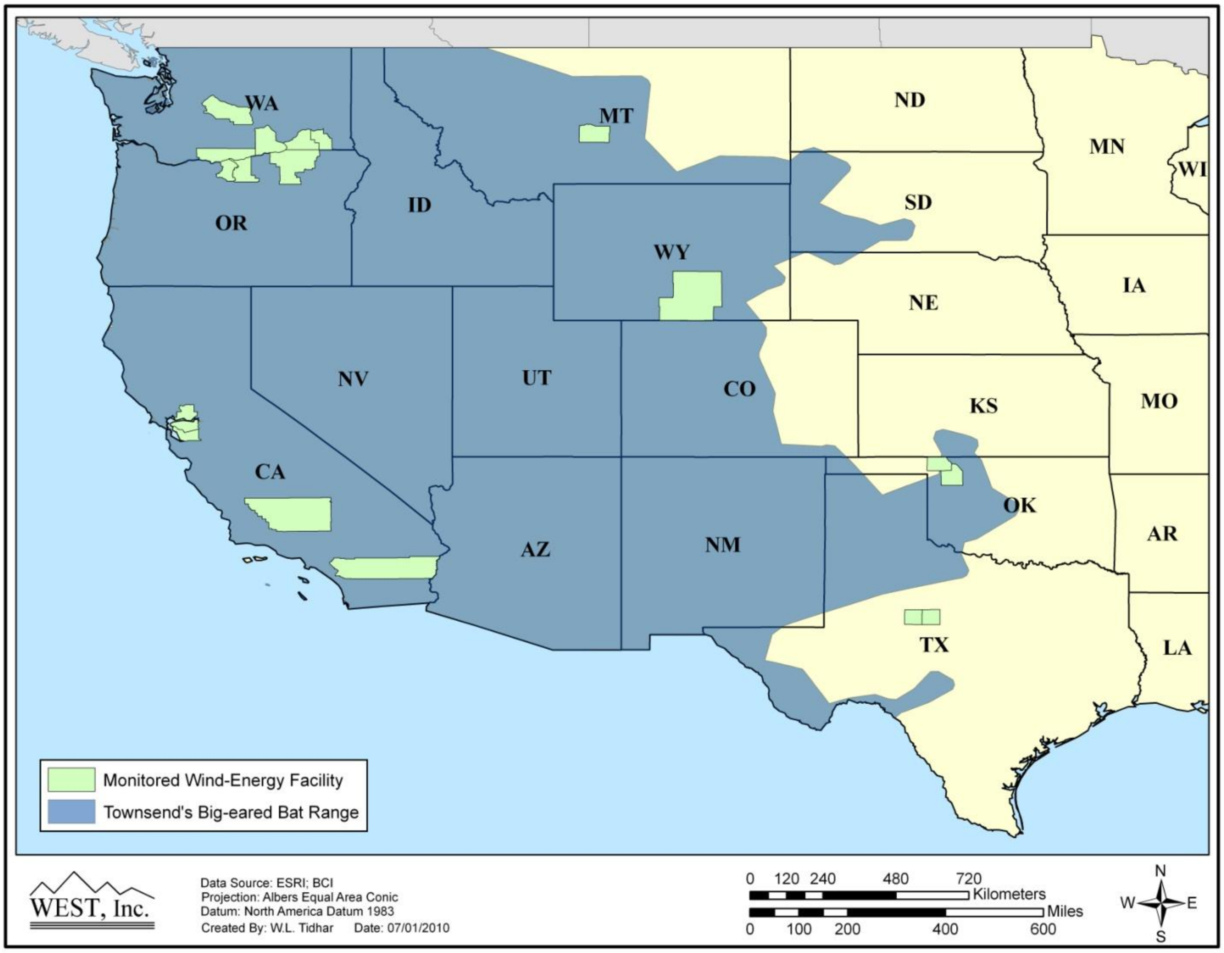

Figure 3.3 Townsend's Big-Eared Bat Range.

<u>Project Site/Local Population</u>. There are no records of Virginia big-eared bat in Greenbrier County, West Virginia (C. Stihler, WVDNR, pers. comm.). The closest roost site is in Fayette County, West Virginia, which is adjacent to Greenbrier County to the west. Based on mapping information provided in Johnson et al. (2005), the closest roost site in Fayette County is approximately 30 miles (48 km) from the Project area. Based on surveys conducted at the site and information provided by WVDNR (C. Stihler, WVDNR, pers. comm.), there are no records for Virginia big-eared bat in the Project area. While it is unlikely that Virginia big-eared bats currently occur in the Project area, the greatest movement recorded between summer and winter roosts was 19.8 miles (31.9 km) (C. Stihler, unpublished data in Piaggio et al. [2009]), suggesting that over time they could pass through the Project area. Therefore, it is possible that over the 25-year term of the ITP, Virginia big-eared bats could occur in the Project area; therefore, it is included as a covered species in this HCP.

Table 3.3 Virginia Big-eared Bat Hibernacula Censuses in West Virginia.

Cave	County	2007	2009	2010	Change (#/%)
Arbogast/Cave Hollow	Tucker	543	586	ns	+43 / 7.1
Cliff	Pendleton	87	138	ns	+51 / 58.6
Green Hollow	Hardy	14	ns	ns	-- / --
Hellhole	Pendleton	5,006	ns	10,025	+5,019 / 100.3
Hoffman School	Pendleton	9	6	ns	-3 / -33.3
Minor Rexrode	Pendleton	203	163	ns	-40 / -19.7
Peacock	Grant	84	68	ns	-16/ 19.0
Schoolhouse	Pendleton	1,285	941	948	-337 / -26.2
Sinnett	Pendleton	75	124	119	+44 / 58.7
Total		7,306	2,026	11,092	+ 3,786 / 51.8

ns = not surveyed
Data provided by Craig Stihler, WVDNR.

Table 3.4 Virginia Big-eared Bat Maternity Colony Censuses in West Virginia.

Cave	RP	2007	2008	2009	Change (#/%)	Comments
Arbogast/Cave Hollow	350	756	728	850	+ 122 / 16.8	Highest since 1988
Cave Mountain	600	432	424	357	- 67 / 15.8	Only declining cave
Cliff	--	880	--	1,151	+ 271 / 30.8	Highest since 2001
Hoffman School	755	1,029	1,077	1,208	+ 131 / 12.2	Highest ever
Lambert	--	295	305	430	+ 125 / 41.0	Highest ever
Mill Run	--	178	203	235	+ 32 / 15.8	Highest since 2000
Mystic	250	569	598	618	+ 20 / 3.3	Highest ever
Peacock	160	985	1,013	1,119	+ 106/10.4	Highest ever
Schoolhouse	338	710	726	795	+ 69 /9.5	Highest since 2003
Sinnett/Thorn	153/14	430	419	482	+ 63 / 15.0	Highest since 1991
Minor Rexrode	95	--	--	--	--	--
Smoke Hole	1	--	--	--	--	--
Total	3,381	6,264	6,373	7,245	+ 872 / 13.7	Highest total ever

RP = Estimate from the recovery plan 1984
Data provided by Craig Stihler, WVDNR.

4.0 IMPACT ASSESSMENT / TAKE ASSESSMENT

Using a surrogate model based on best available scientific information, BRE estimates that covered activities may result in the annual take of between 0 and 5.0 Indiana bats. Based on the project's location at the edge of Virginia big-eared bat range, BRE estimates that covered activities may result in the annual take of between 0 to 1.0 Virginia big-eared bat. Scientific information, including details on the surrogate model used to develop the Indiana bat take estimate, is provided in Section 4.1.3 below. As described below, BRE used the estimated potential take of little brown bats as a surrogate indicator species for potential take of Indiana bats to develop an estimated range of potential take. The likelihood of Indiana bat take at the project and the take estimate range from the model was supported by a combination of on site surveys, information from other wind projects and the following scientific information..

- The only evidence of Indiana bat presence on-site comes from a small number of potential Indiana bat calls collected during acoustic monitoring at ground level. No Indiana bats have been documented within or near the Project area during mist-netting surveys in 2005, 2006, or 2010.
- Indiana bats would not occur on-site during winter when they are hibernating, and no known Indiana bat winter habitat (caves) occurs on or within approximately 9.2 miles (14.7 km) of the Project area.
- The nearest caves are Priority 3, supporting small wintering populations. Snedegar and Martha caves are 9.3 miles (14.9 km) and 12.9 miles (20.6 km), respectively, from the Project area, and known wintering populations are 110 to 304 Indiana bats (in Snedegar Cave) and 145 to 285 Indiana bats (in Martha Cave).
- Female Indiana bats are not likely to birth or raise pups in the Project area as no known maternity colonies occur in the area based on capture surveys during the summer months in 2005, 2006, and 2010. In addition, the site elevation is high enough to limit suitability for maternity colonies (Britzke et al. 2003).
- Only three Indiana bats have been documented at any wind farm as wind turbine fatalities despite over 3,000 bat fatalities reported by wind project monitoring studies within Indiana bat range.

It is possible that undocumented Indiana bat fatalities have occurred at other operating wind farms. However, available information indicates that Indiana bat fatalities are not occurring at the same rates as other bats, or they would have been detected at higher rates by now. While fatality study designs and statistical methods have varied across projects, there are a number of studies within Indiana bat range that included significant carcass search efforts (see Section 4.1.3), and only three Indiana bats have been found to date. In addition, approximately 73% of the fatalities at wind projects in the eastern U.S. have been of hoary bats, red bats, or silver-haired bats, while approximately 9.3% have been *Myotis* species (see Section 4.1.3), thus *Myotis* form a small portion of the known fatalities.

Acoustic bat activity monitoring at wind farms typically shows that the number of high-frequency bat calls (which include *Myotis* calls) is higher at ground-level detectors, while the number of low-frequency calls is higher in or near the rotor swept area (Collins and Jones 2009). Acoustic data collected in 2010 at the Project is consistent with this trend: of high-frequency bat passes measured at four detectors during summer and fall, 93% were at ground level and only

7% were in rotor-swept area (Young and Gruver 2011). Thus, available scientific information, including fatality searches and acoustic monitoring results, indicates that *Myotis* occur in the rotor-swept area much less frequently than other bat species.

The following scientific information indicates that the likelihood of Virginia big-eared bat take is low.

- No Virginia big-eared bats have been documented within or near the Project area during preconstruction mist-netting surveys.
- No hibernacula or maternity colonies are known to occur within or near the Project area.
- No Virginia big-eared bats have been historically documented in Nicholas or Greenbrier counties.
- The closest known roost is over 30 miles (48 km) from the Project area.
- The longest dispersal distance from winter to summer habitat recorded for Virginia-big eared was approximately 19.1 miles (31.9 km); thus, the project is outside the area within which the species would disperse.
- There have been no reported Virginia big-eared bat fatalities from two monitored wind projects within the range of this subspecies.
- Virginia big-eared bat is a subspecies of Townsend's big eared bat. There have been no Townsend's big eared bat fatalities reported for monitored wind projects within the range of the species.

4.1 Anticipated Take

4.1.1 Indirect or Direct Habitat Effects

Construction of the 100-turbine project has or will result in the conversion of 460 acres of predominantly forest to grass/shrubland for the life of project. An additional 71 acres will remain un-vegetated for the life of project. Construction of the initial 67-turbine phase (336 acres of converted habitat and 50 acres permanently un-vegetated) is not a covered activity because it has already occurred and is in the past (baseline); however, it is considered in the HCP to facilitate development of the biological opinion and environmental impact statement. Construction of the 33-turbine phase will result in the conversion of approximately 124 acres of habitat and a life of project impact of 21 acres (Table 2.1). The life of project disturbance will be primarily in deciduous forest vegetation, which could provide suitable foraging and roosting locations for bats.

To avoid potential take of roosting Indiana bats, BRE will limit tree clearing during construction of the expansion (Figure 1.2) to the period between November 15 and March 31, except that up to 15 acres may be cleared between April 1 and May 15 or between October 15 and November 14. The additional 30 to 45 days are needed to provide BRE flexibility to complete clearing should weather or deep snow or ice prevent clearing or create safety issues for construction workers. The clearing of up to 15 acres of trees, outside of the hibernation period, will be conducted within 5 years of the 2010 mist-netting survey, during which no Indiana bats were captured. Removal or clearing of these trees is unlikely to impact roosting Indiana bats given the lack of demonstrated species presence.

Based on the lack of captures during mist-netting and BRE's commitment to cut trees during the winter hibernation period, clearing for the 33-turbine phase will not result in the take of listed species. Furthermore, while potential habitat occurs on-site, the following analysis shows that the minor loss of potential habitat from the Project will not result in "harm" to covered species. Under the ESA, the term "harm" is defined as "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering."

To evaluate the potential for take, including harm, due to clearing, BRE conducted a land cover analysis for the area within 2.5 miles (4.0 km), 5 miles (8 km), and 20 miles (32 km) of the 100-turbine project area using existing land cover mapping and aerial photography (Table 4.1). Since the project is more than 2.5 miles (4.0 km) wide/long, it was divided into three 2.5-mile (4.0-km) radius circles so that existing and proposed turbine locations were included in the 2.5-mile (4.0-km) analysis. The analysis was conducted using 2009 aerial photography and thus includes most disturbance from the 67-turbine project.

Deciduous forest cover is the predominant land cover within 2.5 miles (4.0 km), 5 miles (8 km), and 20 miles (32 km) from the project area (Table 4.1). Ongoing effects of the forest conversion are not expected to rise to the level of take because any Indiana bats that would be displaced from foraging/roosting areas due to Project's conversion of forest land to grass/shrubland would have over 11,000 acres of deciduous forest within 2.5 miles (4.0 km) of the project, almost 150,000 acres of deciduous forest within 5 miles (8 km) of the project, and almost a million acres of deciduous forest within 20 miles (32 km) in which to roost and forage. The conversion of approximately 460 acres of predominately deciduous forest for the 100-turbine project represents 3.5%, 0.3%, and <0.1% of the deciduous forest within 2.5, 5, and 20 miles (4.0, 8, and 32 km) of the Project area, respectively. Furthermore, Indiana bats commonly forage in mixed landscapes (e.g., agricultural lands with fragmented woodlands) (USFWS 2007). Therefore, forest conversion and loss from the project will not impair essential behavioral patterns.

All of the land upon which the Beech Ridge project is constructed and all land within the 2.5-mile (4.0-km) habitat analysis area is owned by one major landowner and several smaller landowners and is either managed for or is eligible for timber harvest. Ongoing and future timber harvest activities will include periodic cutting within and around the Project area, so of the 6,860-acre easement held by Beech Ridge, any or all of the timber may be harvested by the landowners at any time.

Commuting habitat includes wooded tracts, tree-lines, wooded hedgerows, or other such pathways that are connected to roosting or foraging areas (Murray and Kurta 2004). Indiana bats avoid traveling across open areas (Murray and Kurta 2004); of the 34 transmitter-nights (a single bat monitored through one night equals one transmitter-night), no Indiana bats were detected crossing open areas but rather predictably over 5 years used a single tree-lined corridor to move from their roosting to foraging areas. Avoiding these open areas increased the distance bats needed fly by up to 55 percent (between 0.1 and 2.1 additional miles [0.2 to 3.4 km] flown) more than if they had flown directly from day roosts to foraging areas. Similarly, investigators in Missouri found that the areas of activity for five radio-tagged Indiana bats were in heavily

Table 4.1 Summary of Land Cover within 2.5 miles (4 km), 5 miles (8 km), and 20 miles (32 km) of the 100-turbine Project Area.

	Within 2.5 miles (4 km) of Project Area					
	Area 1		Area 2		Area 3	
Land Cover Type	Acres	Percent of 2.5 mile (4.0 km)	Acres	Percent of 2.5-mile (4.0-km) study area	Acres	Percent of 2.5-mile (4-km) study area
Open water	2	0.02	4	0.03	5	0.04
Developed	247	1.96	357	2.85	215	1.71
Barren land	211	1.68	286	2.28	206	1.64
Deciduous forest	11,761	93.60	11,795	93.86	11,706	93.16
Evergreen forest	128	1.02	19	0.15	165	1.31
Mixed forest	181	1.44	85	0.67	201	1.6
Shrub scrub	0	0	0	0	0	0
Grassland/herbaceous	0	0	0	0	0	0
Pasture/hay	11	0.09	1	0.01	18	0.14
Cultivated crops	19	0.15	3	0.03	10	0.08
Wetlands	5	0.04	16	0.12	39	0.31
Total	12,566	100	12,566	100	1,164,668	100.00

	Within 5 miles (8 km) of Project Area		Within 20 miles (32 km) of Project Area	
Land Cover Type	Acres	Percent of 5-mile (8-km) study area	Acres	Percent of 20-mile (32-km) study area
Open water	115	0.07	8,073	0.69
Developed	3,744	2.40	55,954	4.80
Barren land	2,057	1.32	8,502	0.73
Deciduous forest	142,434	91.32	905,834	77.78
Evergreen forest	1,469	0.94	40,200	3.45
Mixed forest	1,814	1.16	41,636	3.57
Shrub scrub	0	0	3	<0.01
Grassland/herbaceous	0	0	802	0.07
Pasture/hay	3596	2.31	86,189	7.40
Cultivated crops	495	0.32	13,683	1.17
Wetlands	256	0.17	3,791	0.32
Total	155,980	100.00	1,164,668	100.00

forested areas and along riparian corridors and forest edges (Ecology and Environment, Inc. 2009). No Indiana bats were recorded in the open areas that are interspersed throughout the research area.

Indiana bats use commuting habitats to travel between roosting and foraging areas, and based on the above-referenced studies, it is likely that gaps of more than 1,000 ft (305 m) may act as barriers to commuting Indiana bats. There are several locations within the Project area where previous clearings, now also occupied by Beech Ridge facilities, are greater than 1,000 ft (305 m) in at least one dimension. However, impacts from construction of the 33-turbine phase will be 4 to 150 ft (1 to 46 m) wide (see Table 2.1), and thus the Project will not created barriers to foraging. Most of the land within the 2.5-mile (4.0-km) radius analysis area is forested; only 206 to 286 acres are classified as barren, which may be the result of timbering or mining, activities that are beyond BRE's control.

Habitat loss due to maintenance activities for the life of the project will be minor. All maintenance activities would occur within areas previously disturbed by construction and thus already converted to grass/shrubland. Turbine maintenance is typically performed up-tower (i.e., O&M personnel climb the towers and perform maintenance within the tower or nacelle and access the towers using pick-up trucks, so no heavy equipment in needed). In the unlikely event (in other words, it may never occur) that a large crane would be needed for maintenance, vegetation would be cleared within areas previously disturbed during construction to provide for safe and efficient operation of the crane, but no tree removal or soil disturbance would be necessary. Ground-disturbing activities may include occasional need to access underground cable or communications lines.

Vegetation within 130 ft (40 m) around turbines to be monitored will be regularly mowed to improve searcher ability to find bird and bat carcasses (Appendix C).

The transmission line route and other Project areas will be inspected for hazard trees that may pose safety threats or potential damage to Project facilities. Hazard trees will be trimmed or cut as needed. Inspections and tree cutting needed for these purposes will occur between November 15 and March 31, except in an emergency where there is a risk to public safety, to ensure no potential for direct impacts to Indiana bats or Virginia big-eared bats.

4.1.2 Direct Effects

Bat fatalities and injury have been reported due to collision with and barotrauma from wind turbines at all wind power projects that have been studied. Although the level of mortality has been variable across regions, species, and seasons (Arnett et al. 2008; Johnson 2005), mortality studies of bats at wind projects in the U.S. have shown several common trends.

- Impacts to bats from wind turbines are unequal across species. Despite there being differences in ecoregions, habitat, and location of wind projects, the majority of bat fatalities at wind projects in the U.S. and Canada have been of the forest/tree dwelling long-distance migrant species hoary bat (*Lasiurus cinereus*), red bat (*L. borealis*), and silver-haired bat (*Lasionycteris noctivagans*) (Arnett et al. 2008; Johnson 2005). The fatality pool for some eastern studies also includes a number of tri-colored bats (*Perimyotis subflavus*), another regional migrant species (Arnett et al. 2008). The least common fatalities from wind projects in the eastern U.S. are of big brown bats (*Eptesicus fuscus*) and *Myotis* species (Arnett et al. 2008; Johnson 2005).

- Impacts to bats from wind turbines are unequal across seasons. The highest mortality occurs during what is believed to be the late summer dispersal or fall migration period for bats from roughly late July to mid-September. Numerous studies across the U.S. and Canada have shown this trend (Arnett et al. 2008; Johnson 2005).

- Impacts to bats from wind turbines are unequal across sites. Studies at different locations in the U.S. and Canada indicate that bat mortality varies with site features or habitat, and while eastern deciduous forests in mountainous areas may be high risk areas (Arnett et al. 2005, 2008; Johnson 2005), high bat mortality has also occurred at wind projects in prairie/agricultural settings (Baerwald 2007) and mixed deciduous woods (Jain et al. 2007; Gruver et al. 2009).

- Impacts to bats are unequal across various turbine heights and rotor sizes. Barclay et al. (2007) suggested that taller turbines have higher impacts based on a review of monitoring study results at wind projects. Results of their analysis did not find a relationship between rotor diameter (rotor-swept area) and bat mortality. Good et al. (2011) observed higher bat mortality at turbines with longer blades and the same nacelle height but did not test for significance. In the case where rotor RPM is the same, it is possible that longer blades create a greater risk simply because blade tip speed is greater for the longer blades. The estimate of potential Indiana bat mortality developed for this Project is based on a per turbine mortality estimate derived from a range of regional studies with different types of turbines, including varying turbine heights and rotor sizes. The existing 67-turbines heights and rotor sizes fall within the range. The 33-turbine expansion will likely include turbines heights and rotors sizes that exceed the range included in the available existing studies from this region. Available scientific information indicates that regional estimates of mortality are more representative of potential mortality at any given site and are a better predictor of potential impacts, than for example turbine size. Also, the estimate of mortality generated for the project, which includes the expansion area, was based primarily on a per turbine basis from a range of studies that had different turbines. This assessment effectively takes into consideration a range of variability in mortality that may be influenced by different turbine sizes, if turbine size does have an influence on bat mortality.

- Several ongoing studies (e.g., Casselman, Mt. Storm, Fowler Ridge, Summerview) show that turbines rotating slowly (e.g., only 1-2 rpm) during low wind speed conditions have less impact on bats regardless of size of turbine. However, other studies suggest that that taller turbines or turbines with longer blades may have greater impacts to bats (Barclay et al. 2007; Good et al. 2011). Differing results from these studies suggest that the relationship of turbine size characters with bat mortality is inconclusive and potentially variable depending on site-specific or other conditions. The use of regional take estimates that encompass turbines of varying size account for variation in mortality that could be influenced by turbine sizes, and such estimates capture potential differences in small and large turbines that could exist but is as as yet inconclusive.

4.1.3 Estimating Take of Indiana Bats

Little information is available regarding the circumstances under which Indiana bats may be at risk of collision or barotrauma[15] with wind turbines. As indicated above, only three Indiana bat fatalities have been recorded at any wind project, which was studied through post-construction monitoring (Johnson et al. 2010; Good et al. 2011). All three fatalities occurred during September. The estimated number of Indiana bats that were impacted at these sites could be higher than three, but the actual number is unknown. In view of the uncertainties associated with Indiana bat fatalities at the Project and the inability to directly quantify take of Indiana bats at the Project, BRE proposes to use the little brown bat as a surrogate for estimating potential take of Indiana bats. Use of this species as a surrogate is supported by the following best available information.

- Indiana bat behavior and ecology are more similar to little brown bats—which are commonly recorded with Indiana bat—than other *Myotis*, and little brown bat has been recorded as fatalities at wind turbines. In addition, Indiana bat was not described as a distinct species until 1928. Prior to that time, it was not distinguished from the little brown bat due to morphological characteristics (USFWS 2007).

- Indiana bat fatalities at wind turbines are a rare event. Of over 3,000 bat fatalities being recorded at wind projects within the range of Indiana bat, three Indiana bat fatalities have been recorded (Johnson et al. 2010; Good et al. 2011). Conversely, data exist concerning interactions of wind turbines with little brown bats. Using these data, an estimate of potential impacts for these species at the Project can be derived.

- Indiana bats could have similar risk of take from turbines as little brown bats. While most evidence from monitoring studies suggests that risk is unequal across species, the evidence is not as clear within genera (e.g., *Myotis*). Characteristics that may be related to risk of collision or barotrauma such as species behavior, habitat, morphology, etc., are likely more similar within genera than across genera.

- Little brown bats are more abundant than Indiana bats, and thus there are sufficient wind farm fatality data from which to model take.

Dr. Kurta (Univ. Michigan, pers. comm.) noted a potential weakness in using little brown bats as a surrogate. In his peer review, Dr. Kurta commented that little brown bats tend to utilize areas over fresh water such as streams and ponds for foraging (areas where wind projects are not constructed), but Indiana bats utilize areas near or over forests (areas where wind projects have been constructed). Dr. Kurta also noted that little brown bats tend to forage lower to the ground than Indiana bats, suggesting that they are below rotor-swept area while Indiana bats may fly

[15] Note: throughout the discussion, casualties to bats can be the result of collision or barotrauma.

near or within the rotor-swept area. LaVal and LaVal (1980) conducted light-tagging experiments using helicopter observations of Indiana bats in Missouri, and all tracked bats foraged below tree-top level. Humphrey et al. (1977) found Indiana bats foraging heights of 7-98 ft (2-30 m) using a combination of visual observations of bats with reflective tape on their bands and ultrasonic detectors. Ford et al. (2005) conducted acoustic sampling at the Fernow Experimental Forest in West Virginia at 63 sites under a closed forest, within a forest canopy gap or forest harvest area or along a stream and recorded below-canopy activity of Indiana bats. These studies suggest that Indiana bats may fly near or within rotor-swept area. In addition, while little brown bats may be somewhat sedentary, occupying buildings and human-made structures, Indiana bats are regional migrants, suggesting that they may encounter wind projects throughout their range as they migrate between winter and summer habitats (A. Kurta, 2010, pers. comm.). These factors suggest that Indiana bats are more likely exposed to turbines than little brown bats; however, the level of potential additional risk cannot be quantified and thus cannot be used to adjust the take estimate because there are insufficient data to determine the particular circumstances that lead to either Indiana bat or little brown bat fatalities, aside from the factors that are known to affect all bat fatalities. Despite these differences, little brown bats represent the best surrogate for the reasons described above. Using little brown bats as a surrogate for the purposes of estimating take was determined in consultation with the USFWS and WVDNR, and this method has been reviewed and supported by three independent peer reviewers plus USFWS reviewers from Regions 3 and 4.

Because no Indiana bats have been captured at the Project and because reported incidents of Indiana bat fatalities are rare, the use of a surrogate provides a reasonable means for estimating potential take. Based on the biological and ecological similarities of Indiana bats with little brown bats, the dissimilarities that could make Indiana bats more susceptible to exposure, and the dissimilarities with the other bats species that occur in West Virginia (Appendix D), little brown bat is a suitable surrogate.

For wind projects in the eastern U.S. within the range of Indiana bat that have been monitored, overall bat mortality estimates have ranged from approximately 8 to 64 bats per turbine per year (Table 4.2). Overall, approximately 74% of the fatalities have been of hoary bats, red bats, or silver-haired bats; approximately 9% have been *Myotis* species (Table 4.3). Many of the wind projects that have been monitored are at sites in similar topography and habitat to the Project (Appendix E). The percentage of little brown bat fatalities found at eastern wind projects has ranged from zero (Buffalo Mountain, TN) to approximately 14.7% (Maple Ridge, NY), with an overall average of approximately 8.6% (Table 4.3). Study design and statistical analytical methods vary among projects, and a recent paper suggests that many of the reported fatality estimates may be low (Huso 2010). However, these studies represent the best available sources to inform the development of this HCP, and BRE proposes to monitor bat fatality at the site using scientifically valid monitoring study designs and statistical techniques to verify the take estimate (see RMAMP, Appendix C).

Table 4.2 Summary of Bat Mortality Reported from Wind Project Monitoring Studies in the Eastern U.S. Within the Range of Indiana Bat.

Project Name, State	No. of Turbines	Estimated No. Bats/ Turbine/yr	95% Confidence Interval	Study Period	Reference
Buffalo Mountain, TN	3	20.8	19.5-22.1[4]	9/29/00-9/30/03	Fiedler 2004
Buffalo Mountain, TN	18	63.9	nr	4/12/05	Fiedler et al. 2007
Mountaineer, WV	44	47.5	31.8-91.6[4]	4/4/03-11/22/03	Kerns and Kerlinger 2004
Mountaineer, WV	44	37.7[1]	31.2-45.1[4]	8/2/04-9/13/04	Arnett et al. 2005
Myersdale, PA	20	25.1[1]	20.1-32.7[4]	8/2/04-9/13/04	Arnett et al. 2005
Maple Ridge, NY	120	24.5	14.3-34.7	6/17/06-11/15/06	Jain et al. 2007
Maple Ridge, NY	195	15.5	14.1-17.0	4/30/07-11/14/07	Jain et al. 2008
Maple Ridge, NY	195	8.2	7.4-9.0	4/05/08-11/9/08	Jain et al. 2009
Pennsylvania, PA	10	30.1	28.1-33.4[5]	2007	Capouillez and Librandi-Mumma 2008
Casselman, PA	23	32.2	20.8-51.4	7/26/08-10/10/08	Arnett et al. 2009a
Mount Storm, WV	82	24.2[2]	17.1-33.1	7/18/08-10/17/08	Young et al. 2009a
Mount Storm, WV	132	28.6[3]	18.7-40.5	3/23/09-6/14/09 & 7/16/09-10/8/09	Young et al. 2009b, 2010a
Average		29.9			

[1] estimate for the 6-week study period
[2] estimate for the 12-week study period
[3] estimate based on combination of spring and fall results
[4] reported as 90% CI
[5] reported as 99% CI
nr = not reported by authors

4.1.3.1 Calculating Potential Take

Using little brown bat as a surrogate, the potential take of Indiana bats at the Project is estimated as follows.

1. Results from the studies within 200 miles (320 km) (Table 4.4) of the Beech Ridge site show that between 24 and 48 bat fatalities will occur per turbine per year based on information from projects in the region and with similar turbines (Appendix E). Expanding this estimate to 100 turbines yields an estimate of between 2,400 and 4,800 bat fatalities per year at the Project. This analysis bases the potential mortality on a per turbine basis under the assumption that the turbine is the risk factor, and similar turbines present approximately equal risk.[16] The studies from the four sites for which the estimate

[16] No published studies to date have looked at the relationship of turbine location within a wind project and bat mortality. The Mountaineer and Myersdale studies (Arnett et al. 2005), which looked at all turbines at the sites, did not find any relationship between turbine location and mortality but did note that the one turbine that was not operational during the studies had no bat mortality. At the Mount Storm facility, Young et al. (2009a, 2010a) noted that one turbine in the study

Table 4.3 Number of Bat Species Fatalities Found at Wind Project Monitoring Studies in the Eastern U.S. Within Range of Indiana Bat.

	Project Number (Percentage)			
Species	Buffalo Mountain	Mountaineer	Mount Storm	Myersdale
Hoary Bat	44 (12.1)	244 (25.9)	305 (32.6)	138(46.2)
Red Bat	222 (61.2)	312 (33.2)	327 (34.9)	82 (27.4)
Silver-haired Bat	20 (5.5)	52 (5.5)	107 (11.4)	18 (6.0)
Tri-colored Bat	71 (19.6)	199 (21.1)	91 (9.7)	23 (7.7)
Little Brown Bat	0 (0.0)	107 (11.4)	56 (6.0)	9 (3.0)
Big Brown Bat	3 (0.8)	15 (1.6)	36 (3.9)	18 (6.0)
Northern Long-eared Bat	0 (0.0)	6 (0.6)	1 (0.1)	2 (0.7)
Seminole Bat	2 (0.6)	0 (0.0)	2 (0.2)	0 (0.0)
Unidentified bat	1 (0.3)	6 (0.6)	10 (1.1)	9 (3.0)
Total	363	941	935	299

	Project Number (Percentage)			
Species	Maple Ridge	PGC	Casselman	Total
Hoary Bat	337 (46.8)	61 (28.9)	74 (29.8)	1,203 (32.4)
Red Bat	83 (11.5)	67 (31.8)	41 (16.5)	1,134 (30.5)
Silver-haired Bat	126 (17.5)	30 (14.2)	64 (25.8)	417 (11.2)
Tri-colored Bat	0 (0.0)	33 (15.6)	27 (10.9)	444 (11.9)
Little Brown Bat	106 (14.7)	10 (4.7)	32 (12.9)	320 (8.6)
Big Brown Bat	44 (6.1)	10 (4.7)	7(2.8)	133 (3.6)
Northern Long-eared Bat	0 (0.0)	0 (0.0)	0 (0.0)	9 (0.2)
Seminole Bat	0 (0.0)	0 (0.0)	2 (0.8)	6 (0.2)
Unidentified bat	24 (3.3)	0 (0.0)	1 (0.4)	51 (1.4)
Total	720	211	248	3,717

accounted for 15-20% of the observed number of bat fatalities. This study used a sampling approach, and it was not known if there were other turbines that accounted for high numbers of bat fatalities.

Table 4.4 Summary of Bat Mortality from Wind Project Monitoring Studies Within 200 Miles (320 km) of the Beech Ridge Wind Project.[17]

Project	No. of Turbines	Bats/ Turbine/yr	95% CI	Study Year(s)	Reference
Mountaineer	44	47.5	31.8-91.6[4]	2003	Kerns and Kerlinger 2004
Mountaineer	44	37.7[1]	31.2-45.1[4]	2004	Arnett et al. 2005
Myersdale	20	25.1[1]	20.1-32.7[4]	2004	Arnett et al. 2005
Casselman	23	32.2	20.8-51.4	2008	Arnett et al. 2009a, 2009b
Mount Storm	82	24.2[2]	17.1-33.1	2008	Young et al. 2009a
Mount Storm	132	28.6[3]	18.7-40.5	2009	Young et al. 2009b, 2010a
Mount Storm	132	32.3[3]	26.4-43.5	2010	Young et al. 2010b, 2011
Total/Average		32.5			

[1] estimate for the 6-week study period
[2] estimate for the 12-week study period
[3] estimate based on combination of spring and fall results
[4] reported as 90% CI

of bat mortality was derived are considered valid for a number of reasons. These studies used scientifically valid methods for post-construction monitoring, including systematic carcass searches and field measures of carcass removal and searcher efficiency to account for potential biases. In addition, all used the same base statistical estimator (Shoenfeld 2004) with study-specific improvements for determining overall impacts. Furthermore, the 95% confidence intervals for the studies overlap, suggesting that there were no statistical outliers within the range of mean fatality rates (Table 4.4). While improvements have occurred to the methods and estimator over time, these studies provide a suite of results from the same ecological region[18] and for wind projects with similar turbines and development characteristics and are considered more relevant to the Project than, for example, studies from the Northeast or Midwest. It is not practicable to reanalyze these study results given the inability to obtain original relevant data, as well as the time and cost associated with such an exercise. Furthermore, BRE has analyzed and presented a range of fatality estimates, which reduces the effects of biases in the estimator on the take estimates presented in this HCP. Finally, the fatality estimates will be verified through post-construction monitoring (Appendix C).

[17] The location of the Pennsylvania project in Table 4.4 is unknown as it is not reported by Capouillez and Librandi-Mumma (2008). Buffalo Mountain, Tennessee, is located approximately 225 miles (360 km) southwest of Beech Ridge and not included here due to distance and lack of *Myotis* fatalities observed at that site to help with understanding risk to *Myotis* bats.
[18] The four studies all occurred at Projects within the Allegheny Mountains ecological section of the Central Appalachian Broadleaf Forest Ecological Subregion, which is the same section and subregion in which the BRE Project is located.

2. Results from the studies cited in Table 4.5 show that the high end estimate of approximately 12.9% of the total bat fatalities would be little brown bats. Based on this information, between 310 and 620 little brown bat fatalities would occur per year at the Project.

3. Live bat data collected in West Virginia suggest that Indiana bats represent approximately 0.81% of the population of little brown bats in the Project area. The surrogacy ratio is based on data collected by WVDNR over a period of eight years, during which approximately 450 studies conducted at a variety of sites throughout West Virginia (Table 4.6). For the majority of the approximately 450 surveys (some reports contained results from multiple surveys) that were used to determine the little brown bat to Indiana bat ratio, the netting protocol followed the USFWS guidelines for determining presence/probable absence of Indiana bats. The majority of these netting efforts were conducted to try to detect Indiana bats prior to tree clearing for land development projects such as timber harvest, coal mining, road construction, pipelines, etc., so for all of these sites the presence/absence of Indiana bats was unknown prior to the survey, but as the sites were within the species range and suitable habitat was present, a survey was warranted. The sites were scattered throughout West Virginia and, according to scientific information regarding Indiana bats, were within the migratory range of the species—similar to the Project site. The wide variety of sites studied and the span of eight years mitigate any biasing effects of annual, geographic/habitat, and population variation, such that the ratio used takes into account these variables. WVDNR recommended basing the ratio on sites where species composition was unknown prior to the mist-net study to avoid biasing the numbers towards a higher proportion of Indiana bats.

4. Based on this information, between approximately 2.5 and 5.0 Indiana bat fatalities would occur in the 100-turbine Project area annually (Table 4.7), in the absence of avoidance, minimization, and mitigation measures to reduce fatality impacts. For the existing 67-turbine project, the estimated take would be between 1.6 and 3.1.

4.1.3.2 Supporting Evidence for Model Selection

The modeling results are sensitive to the ratio of Indiana bat to little brown bat used. The model assumes that fatalities of Indiana bat and little brown bat—which is the most common *Myotis* fatality at wind turbines—occur with equal probability in the Project area and equally over time. As set out in Section 3.2.1 above, the surveys did not detect Indiana bats during the study periods, but for the purposes of this HCP, the presence of Indiana bats is assumed during the life of the project. The model used the ratio of Indiana bats to little brown bats from mist-netting surveys conducted at sites in West Virginia where the species composition at the site was unknown prior to the survey. This model is considered the least biased because it is unlikely to have inflated the ratio of Indiana bats to little brown bats by either underestimating little brown bat abundance or overestimating Indiana bat abundance. This model is most consistent with the results of the site-specific surveys. The mist-netting surveys on-site did not capture any Indiana bats (BHE 2005, 2006b; Sanders Environmental, Inc. 2010a, 2010b).

Table 4.5 Number of Bat Species Fatalities Found at Wind Project Monitoring Studies Within 200 miles (320 km) of the Beech Ridge Project.

Species	Mountaineer # (%)	Mount Storm # (%)	Myersdale # (%)	Casselman # (%)	Total (%)
Hoary bat	244 (25.9)	305 (32.6)	138(46.2)	74(29.8)	761 (31.4)
Red bat	312 (33.2)	327 (34.9)	82 (27.4)	41(16.5)	762 (31.4)
Tri-colored bat	199 (21.1)	91 (9.7)	23 (7.7)	27(10.9)	340 (14.0)
Silver-haired bat	52 (5.5)	107 (11.4)	18 (6.0)	64(25.8)	241 (10.0)
Little brown bat	107 (11.4)	56 (6.0)	9 (3.0)	32(12.9)	204(8.4)
Big brown bat	15 (1.6)	36(3.8)	18 (6.0)	7(2.8)	76 (3.1)
Northern long-eared bat	6 (0.6)	1 (0.1)	2 (0.7)	0(0.0)	9 (0.4)
Seminole bat	0 (0.0)	2 (0.2)	0(0.0)	2 (0.81)	4(0.2)
Unidentified bat	6 (0.6)	10 (1.1)	9 (3.0)	1(0.4)	26 (1.1)
Total	941	935	299	248	2423

Table 4.6 Number of Little Brown Bats and Indiana Bats Captured in Mist Net Surveys in West Virginia in Areas Where Indiana Bats Had Not Been Documented Previously (i.e., Excluding Surveys to Monitor Indiana Bats at Known Locations).

Year	No. Little Brown Bats	No. Indiana Bats	Ratio of Indiana Bats to Little Brown Bats (%)
2003	373	3	0.80
2004	266	13	4.88
2005	446	5	1.12
2006	559	0	--
2007	827	3	0.36
2008	996	4	0.40
All years	3,467	28	0.81

Table 4.7 Results of Model Estimating Take of Indiana Bats for the Beech Ridge Project (100 Turbines).

Data Sources	Estimate of Total Annual Bat Mortality	Percent of Fatalities that Are LBB	Estimate of Annual LBB Mortality	Percent Indiana Bats	Estimate of Annual Indiana Bat Mortality
Mist-netting at sites with previously unknown species composition	2,400	12.9%	310	0.81%	2.5
	4,800	12.9%	620	0.81%	5.0

The results of the analysis and the supposition that the estimate is reasonable are supported by several studies indicating that the risk to bats from wind turbines is unequal across species and seasons and that, in general, risk to *Myotis* species is low. The Buffalo Ridge and Foote Creek studies are not included in the surrogate model because they are located outside Indiana bat range. The Fowler Ridge and Buffalo Mountain projects and the Wisconsin projects were not included because they are located outside of the Appalachian Mountain Recovery Unit and more than 200 miles (322 km) from the Project area.

- Buffalo Ridge, Minnesota - AnaBat and mist net data indicated high relative abundance of bats, such as little brown bat and big brown bat, in close proximity (i.e., within 2.3 miles [3.6 km]) of the wind project in June and early July when collision mortality was the lowest (Johnson et al. 2003).

- Foote Creek Rim, Wyoming - Of 260 bats captured in mist nets in the vicinity of the wind project, 81% were bats in the genus *Myotis*, with long-legged myotis (*Myotis volans*) and little brown bat being the most prevalent, yet members of this genus comprised only 6 (5%) of the 123 turbine collision mortalities during the study (Gruver 2002). Hoary bats comprised 88.1% of the fatalities at Foote Creek Rim, but species other than hoary bats were responsible for 95% of all identifiable calls recorded at turbines with the AnaBats (Gruver 2002; Young et al. 2003).

- Buffalo Mountain, Tennessee - Two *Myotis* species, little brown bat and northern long-eared bat, were detected near the wind project with AnaBats and mist nets, yet neither species was among the bat fatalities documented at the project (Fiedler 2004; Fiedler et al. 2007).

- Wisconsin Wind Project – Howe et al. (2002) report large populations of big brown and *Myotis* bats in the area, but only six of 72 bat carcasses found underneath turbines were of these species; the remainder were comprised of hoary, eastern red, and silver-haired bats (Howe et al. 2002).

- Recent research at proposed wind power sites has investigated trends in bat use at different elevations by elevating AnaBat detectors to heights near turbine rotor-swept area. Much of this research has shown that bat activity in general has been lower near the 164-ft (50-m) level above the ground but also that the number of high-frequency bats recorded at the elevated position is lower, suggesting that the smaller bats that fall in the high-frequency category such as *Myotis* species tend to forage and fly closer to ground level than low-frequency bats (Arnett et al. 2006; Redell et al. 2006; Collins and Jones 2009).

- One of the proposed hypotheses for why bats are exposed to turbines and collision or barotrauma impacts is that bats are curious and investigate the turbines. Existing data either do not support this theory because of apparent unequal risk across species, or the data support the theory that bats are unequally curious. If Indiana bats fall within the class of curious bats, it is likely that numerous Indiana bat fatalities would have been discovered at wind turbine facilities.

Consistent results among these studies show that bat mortality at wind projects is unequal across species, that relative abundance of species as determined by post-construction monitoring studies is the best predictor of bat mortality, and that resident bats in and around wind projects do not appear to be affected as greatly as long-distance migrant species. These results indicate that populations of summer resident bats near wind projects are not highly susceptible to turbine collision and that impacts to resident species such as little brown bats, big brown bats, northern long-eared bat, and Indiana bats found near the Project area are likely to be low. This information supports the conclusion that mortality of Indiana bats at the Project is unlikely to be correlated to their abundance (it is likely to be lower) and that an annual fatality estimate for the facility of up to 5.0 individuals, before implementation of avoidance and minimization measures, is reasonable. Site-specific monitoring and life history data indicate that no Indiana bats occur at the site. If mortality of Indiana bats is lower than their abundance then no fatalities would be expected.

4.1.4 Alternative Models Considered But Not Used

Alternative models for estimating potential take of Indiana bats were considered but were not used because (1) available data biased the abundance estimate of Indiana bats or (2) available data were insufficient to accurately model potential impacts. Also, available data indicate that the model that was used for this document takes into account the variables that would inform these alternative models.

4.1.4.1 Use of Alternate Sources of Indiana Bat Abundance Data

Two additional sources of data were considered to estimate the percent of Indiana bats relative to little brown bats: (1) the percent of Indiana bats captured at all mist-netting sites in West Virginia whether those sites were known to be occupied by Indiana bats or not and (2) the percent of Indiana bats counted during winter cave surveys in West Virginia. Use of the first data set would suggest that the number of Indiana bats is approximately 2.1% of the number of little brown bats in the Project area (the total number of Indiana bats captured during mist-netting surveys in West Virginia from all sites whether they were known to be occupied by Indiana bat or not was approximately 2.1% of the number of little brown bats captured [C. Stihler, WVDNR, pers.

comm., unpublished data]). The cave count data would suggest that Indiana bats comprise approximately 7.4% of the little brown bats in the Project area (approximately 7.4% of the *Myotis* counted during winter cave surveys in West Virginia have been Indiana bats [C. Stihler, WVDNR, pers. comm., unpublished data]). For these models, of the 310-620 estimated little brown bat fatalities, between 6.5 and 13.0 or between 22.9 and 45.9 Indiana bat fatalities would occur in the project annually (Table 4.8).

These data overestimate the percent of Indiana bats relative to little brown bats and thus inflate the estimate of Indiana bat fatalities. The results of the mist-netting surveys at all sites, including known Indiana bat sites, oversample Indiana bats when compared to sites across the landscape where the species composition was unknown because they include areas where Indiana bats were targeted for capture. Use of the cave data to inform the percent of Indiana bats relative to little brown bat is also biased because the primary focus of the hibernacula surveys are caves with endangered bats (Indiana bat and Virginia big-eared bat) (C. Stihler, WVDNR, pers. comm.). Caves without the endangered species are not routinely counted, and portions of caves that do not house the endangered species are also not routinely counted (C. Stihler, WVDNR, pers. comm.). Thus, the overall population estimates of little brown bat is biased low, which in turn increases the ratio of Indiana bats to little brown bats. It is highly unlikely that the number of Indiana bats is 2.1% or 7.4% of the number of little brown bats that may be at risk from the Project because these data inflate the ratio of Indiana bats to little brown bats.

4.1.4.2 Determining Take Based Upon Species Occurrence Across the Landscape

Indiana bats are known to occur across approximately a 25-state region; however, the species does not occur randomly across the landscape. Indiana bats are cave-dwelling bats that hibernate in suitable caves during winter. After spring dispersal, adult females congregate at maternity colonies that are generally a cluster of roost trees in suitable habitat for rearing pups. The

Table 4.8 Results of Alternate Models Estimating Take of Indiana Bats for the Project (100 turbines).

Data Sources	Estimate of Total Annual Bat Mortality	Percent of Fatalities that Are LBB	Estimate of Annual LBB Mortality	Percent Indiana Bats	Estimate of Annual Indiana Bat Mortality
All mist-netting sites (includes sites where Indiana bats were previously captured)	2,400	12.9%	310	2.1%	6.5
	4,800	12.9%	620	2.1%	13.0
West Virginia cave counts (conducted at sites where Indiana bats are found)	2,400	12.9%	310	7.4%	22.9
	4,800	12.9%	620	7.4%	45.9

distribution of males during the summer months tends to be more variable, but they will often remain near the hibernacula. Given these known patterns of Indiana bat distribution, wind turbines (or other risk factors) that are closer to concentrations of Indiana bats could pose higher risk. Also, due to variable impacts from wind projects in varying physiographic regions, wind projects in similar physiographic regions as those with the highest impacts could also pose higher risk. This is corroborated by results of monitoring studies clustered in certain regions that have shown similar impacts. However, the distribution of Indiana bats around the existing wind projects in Indiana bat range is generally unknown. Also, due to the general lack of Indiana bat impacts from wind projects, it is difficult to understand the relationship between distance from habitat features used by Indiana bats and risk. The take estimation model used in this HCP takes into account the variation in bat occurrence on the Project landscape by applying the information from the nearest known projects in similar habitat and topography (see Table 4.4).

4.1.4.3 Determining Take Based Upon Species Occurrence Over Time

As with spatial distribution, Indiana bat occurrence in an area varies over time. During the different seasons the level of Indiana bat occurrence (or use) in any given area is variable and because they are highly mobile animals, occurrence can vary on a daily basis. As Indiana bat occurrence varies over time, risk could also vary—in particular if risk is related to abundance or use. Numerous monitoring studies indicate that impacts to bats in general are unequal across seasons, with most mortality occurring in the late summer to fall periods during migration. Due to the general lack of examples of Indiana bat impacts from wind projects, it is difficult to predict the relationship between temporal variation in Indiana bat use of an area and impacts. The take estimation model used in this HCP takes into account the variation in bat occurrence over time by applying the information from annual and high-risk season monitoring studies.

4.1.4.4 Determining Take Based on Habitat Alteration Analysis

Bat fatalities at wind farms occur primarily due to project operations, and thus the surrogate model used to prepare the take estimate focused on flying bats and not habitat loss. The evaluation of impacts of habitat loss and conversion showed that habitat loss will not rise to the level of take (i.e., is insignificant or discountable) (see Section 4.1.1). Notwithstanding this conclusion, BRE proposes to implement habitat mitigation to address all unavoidable impacts.

4.1.5 Avoidance, Minimization and Mitigation Measures

4.1.5.1 Overview

In issuing an ITP, the USFWS must find, among other things, that the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking.[19] The term "maximum extent practicable" is not defined in the ESA, nor is it defined in any agency regulations.[20] According to at least some courts, the maximum extent practicable standard does not mean that an applicant must implement all conservation measures that it can afford to

[19] *See* 50 C.F.R. § 17.22(b)(2)(B).
[20] *See Nat'l Wildlife Fed'n v. Norton*, 306 F. Supp. 2d 920, 927 (E.D. Cal. 2004).

implement while still going forward with development.[21] Rather, the "maximum extent practicable" standard means that the conservation measures proposed by the applicant must be commensurate with the level of take under the plan. Stated differently, an applicant for an ITP must demonstrate that its avoidance, minimization, and mitigation measures are commensurate with the anticipated impacts of the take, are rationally based and supported by science, and are reasonably capable of being accomplished. It is only where certain constraints may preclude full minimization or full mitigation that the "practicability" issue needs to be addressed more thoroughly. Here, as will be described, BRE's proposed minimization and mitigation is commensurate with the impact of the taking, and it has provided funding assurances to ensure proper implementation of the HCP.

The estimated potential take associated with covered activities before accounting for the beneficial effects of BRE's proposed avoidance, minimization, and mitigation efforts ranges from 0 to 5.0 Indiana bats per year based on 100 turbines or between 0 and 125.0 Indiana bats over the term of the permit. The original design of the Project called for construction and operation of 124 turbines at the site. As a result of discussions and negotiations with environmental organizations as reflected in a January 26, 2010, settlement agreement,[22] the Project was reduced from 124 turbines to 100 turbines. Using the same approach for estimating take applied in Section 4.1.3 above, the estimated potential take associated with a 124-turbine project would have been about 25% greater (6.3 Indiana bats per year) than the current project after its reduction in size.[23]

To avoid and minimize take of covered species, BRE proposes to adjust the turbine cut-in speed on all project turbines from 7.8 mph (3.5 m/s) to 10.7 mph (4.8 m/s) for a 12-week period between mid-July and mid-October each year and for the time of night commencing one-half hour before sunset for a period of five hours (BRE's Curtailment Plan). BRE estimates that this avoidance and minimization strategy will reduce potential take by 50%, resulting in a take estimate ranging between 0 to 2.5 Indiana bats per year after the third year of the permit or between 0 and 70.0 over the term of the permit. To mitigate the effects of unavoidable incidental take, BRE proposes to implement off-site habitat conservation actions to protect and enhance covered species and key species habitats as described in Section 5.0.

As described in Section 4.2.1 below, the impacts associated with the take of 0 to 5.0 Indiana bats per year during the first three years of the permit and 0 to 2.5 Indiana bats per year after the third year of the permit (70.0 Indiana bats over the life of project) are likely low given the current population size of the Appalachian Mountain Recovery Unit. BRE proposes to implement actions to meet biological goals and objectives and an adaptive management strategy to reduce estimated take of covered species by at least 50% after years 1-3 of the ITP. The basis for these

[21] *Id*.
[22] *See Animal Welfare Institute, et al. v. Beech Ridge Energy LLC, et al.,* No. RWT 09cv1519 (S.D. MA January 26, 2010).
[23] In addition, as a result of discussions with environmental groups, BRE eliminated previously permitted turbine sites within the eastern portions of the Project, those closest to the known Indiana bat hibernacula (Snedegar and Martha caves), historical hibernacula (Bob Gee Cave), and the proximate area where many caves occur (BHE 2006a). Prior to these design changes, the nearest turbine to the hibernacula was approximately 6.0 miles (9.6 km) (Snedegar Cave) and 9.0 miles (14.4 km) (Martha Cave) (BHE 2006a). After design changes, this distance increased to 9.3 and 12.9 miles (15.4 and 20.6 km), respectively.

proposed conservation measures and how such measures are rationally related to the impacts of the take that may occur are described in detail below.

The project is not expected to result in direct impacts to currently known maternity areas; the direct effects noted above would be primarily to migrating bats. However, since migrating bats originate from a maternity area or wintering area somewhere, impacts to breeding or wintering populations are likely spread out over time and space (i.e., gradual small takes of migrating individuals from potentially many different populations, as opposed to effects concentrated at a known maternity area or hibernacula). As described in Section 8.0, changed circumstances conditions may be triggered if this proves not to be the case. As a result, and as described in Section 4.2.1 below, the impacts associated with the take are low given the current population size of the Appalachian Mountain Recovery Unit.

4.1.5.2 Biological Basis for the Curtailment Plan

Biological Basis for 10.7 mph (4.8 m/s) Turbine Cut-In Speed. As detailed in the RMAMP, recent studies have shown that raising wind turbine cut-in speeds to 11.2 mph (5.0 m/s) during fall migration will produce reductions in mortality in the range of 44% to 93% (see Section 2.1 of the RMAMP for background). Initially, BRE will test a slightly lower cut-in speed (10.7 mph [4.8 m/s]) to determine if similar reductions in bat fatalities can be achieved at the Project site while allowing the generation of more wind-generated electricity. Available scientific information does not indicate that increasing the turbine cut-in speed by 0.4 mph (0.2 m/s) to 11.2 mph (5.0 m/s) will result in significant reductions in the effects of the take (Baerwald et al. 2009; Arnett et al. 2010; Good et al. 2011; Young et al. 2011), particularly since the impacts of the take at 10.7 mph (4.8 m/s) are already low. Should the initial minimization approach fail to deliver the expected reduction in mortality, BRE's adaptive management plan calls for adjustments to the operational protocols, including testing higher cut-in speeds, to achieve the HCP's biological goals and objectives.

Available scientific information indicates that by implementing a turbine cut-in speed of 10.7 mph (4.8 m/s) BRE will achieve its biological goals and objectives of reducing all bat mortality commensurate with best available science and achieve a 50% or greater reduction in take of covered species. With that being said, BRE is also adopting an adaptive management strategy to intensively study different turbine operational protocols to meet the biological goals of the conservation plan. Testing a different cut-in speed will add to the growing body of knowledge regarding adjusting turbine operations as a means by which to reduce impacts to bats. Evidence to date suggests that benefits to bats from curtailing turbines may be related to several factors including the site location, overall impact to bats, species composition, the turbine type/model, and the turbine behavior in winds below cut-in speed (Good et al. 2011; Young et al. 2011).

Biological Basis for Selection of Turbine Cut-In Speed. To date, the Fowler Ridge Study (Good et al. 2011) is the only study that has indicated wind energy projects may achieve increased reductions in mortality from raising cut-in speeds above 11.0 mph (5.0 m/s). The Fowler study showed a 50% reduction in bat mortality by implementing a turbine cut-in speed of 11.0 mph (5.0 m/s) and a 78% reduction in bat mortality by implementing a turbine cut-in speed of 14.3 mph (6.5 m/s) (see Section 2.1 of the RMAMP for additional details). Said another way, for the first 3.3 mph (1.5 m/s) increase in cut-in speed, a 50% reduction was obtained. For the next 3.3 mph (1.5 m/s) increase, another 56% reduction was realized (for a total of 78%) *at that site*. However, there is uncertainty surrounding the applicability of the Fowler results to the Project area given the differing habitat conditions, bat activity, turbine models, and operations at these projects.

Fowler Ridge study results show that bat casualty rates may be affected by bat activity, weather, turbine type, turbine operations, and habitat conditions. The characteristics of the Fowler site are substantively different from those at the Beech Ridge site. The Fowler Ridge project currently has a total energy capacity of 600 MW, substantially larger than Beech Ridge, and it includes three turbine types: 182 Vestas V82 1.65-MW turbines, 40 Clipper C96 2.5-MW turbines, and 133 1.5-MW General Electric (GE) SLE (Table 4.9).

The Fowler turbines (including the GE turbines) operated differently below cut-in speeds than the proposed Beech Ridge turbine protocols. At Fowler, the turbines blades were permitted to freewheel when they were below the cut-in speed. Freewheeling turbines can spin at speeds of up to 9 rpm in winds under the cut-in speed. At Beech Ridge, turbine rotation will be limited by feathering the turbine blades so there is only minimal rotation (<2 rpm) at winds below cut-in speeds. Recent studies have shown that reducing turbine blade rpm below cut-in speed can have a significant impact on bat mortality (Young et al. 2011).

In addition to physical differences at the project turbines, the Fowler Ridge project is located in western Indiana in flat to slightly rolling farmland—a substantively different landscape from the mountains of southeastern West Virginia where the Beech Ridge project is located. Elevations in the Fowler Ridge project area range from approximately 700-800 ft (213-244 m) (Beech Ridge lies at 3,650 ft [1,112 m] elevation). The Fowler project area is dominated by tilled agriculture, with corn (*Zea mays*) and soybeans (*Glycine max*) being the dominant crops. Of the roughly 54,880 acres (about 86 square miles) within 0.5 mi (0.8 km) of turbine locations, row crops comprise about 93% of the land use (Good et al. 2011). The Beech Ridge landscape, by contrast, is comprised of mostly deciduous forests on high-elevation ridgetops and where land uses are timbering, mining, and recreation. Furthermore, unlike Beech Ridge, the Fowler Ridge

Table 4.9 Turbine Characteristics at the Fowler Ridge and North Allegheny Wind Farms (Good et al. 2011; L. Hill, 2011, pers. comm.).

Turbine Model/MW	Turbine Height (m)	Rotor Diameter (m)	Standard Cut-in Speed (mph / m/s)
Fowler Ridge			
GE SLE/1.5	80	77	7.8/3.5
Vestas V82/1.65	80	82	7.8/3.5
Clipper C96/2.5	80	96	7.8/3.5
North Allegheny	78	87	8.8/4.0

site is within the heart of Indiana bat range. The range maps in the *Indiana Bat Draft Recovery Plan: Revision 1* (USFWS 2007) confirm that Indiana bat occurrence is widespread throughout the Midwest states, and the population numbers in the Midwest Recovery Unit are the greatest (nine times greater than the number found in the Appalachian Mountain Recovery Unit).

Given the differences in the project size, turbine types, turbine behavior, land cover, and land use, results from the Fowler Ridge studies may not be directly applicable to the Beech Ridge site. In contrast, all of the available studies (Baerwald et al. 2009; Arnett et al. 2010; Good et al. 2011) show that raising cut-in speeds to 11.2 mph (5.0 m/s) significantly reduces impacts to all bats. Considering that (1) the impact of the potential take without any turbine operational changes is already low; (2) current studies show that BRE's proposed minimization efforts is reasonably certain to reduce mortality by 44 to 93%; and (3) higher cut-in speeds will have significant negative impacts to energy production, as discussed below, BRE has determined that it is reasonable to initially evaluate a turbine cut-in speed of 10.7 mph (4.8 m/s) as the starting point for its minimization strategy. In addition, the circumstances surrounding the recent take a the North Allegheny wind farm (see below) do not indicate that the proposed strategy should be altered.

The North Allegheny wind farm consists of 35 Gamesa wind turbines rated at 2.0 MW each for a total capacity of 70 MW. The turbine towers are 256 ft (78 m) tall. The blades length is 130 feet (43 m) creating a rotor diameter of 285 ft (87 m) including the rotor hub. The total rotor swept area extends from approximately 113 to 399 feet (35 to 122 m) above ground level. The normal cut-in speed for the turbines is 8.8 mph (4.0 m/s).

The North Allegheny Wind Farm (North Allegheny Wind, LLC) is located in Cambria and Blair counties, in south-central Pennsylvania in the Central Appalachian Ecoregion just west of the transition to the Ridge and Valley Ecoregion (EPA 2010). Beech Ridge is also located in the Central Appalachian Ecoregion approximately 190 miles (304 km) to the southwest. Elevations in the North Allegheny project area range from approximately 2,200 ft to 2,700 ft (670 to 823 m); elevations in the Beech Ridge Project area range from approximately 3,650 ft to 4,340 ft (1,078 to 1,322 m). The North Allegheny project area is dominated by forested land (mature mixed deciduous forest) with smaller areas of cleared land, reclaimed surface mined land, and road and transmission line right-of-ways. The Project area is also mixed deciduous forest but of variable age due to the current timber industry land management and has greater amounts of cleared areas and also reclaimed surface minded lands. The North Allegheny project is approximately 15.5 miles (24.8 km) from the Canoe Creek Priority 2 hibernacula, which is within the zone around Priority 2 hibernacula where Indiana bats have been documented roosting during the swarming season[24] (USFWS 2007, L. Hill, 2011 pers. comm.). The North Allegheny project is also within 14.0 miles (22.4 km) of the Canoe Creek maternity area; and within 22.0 and 28.0 miles (35.2 and 44.8 km) of two other known maternity areas, Shaffer Mountain and Shawnee, respectively (L. Hill, 2011, pers. comm.). The Project is approximately 9.3 miles

[24] "Swarming" occurs at the cave entrance where "large numbers of bats fly in and out of cave entrances from dusk to dawn, while relatively few roost in the caves during the day" (Cope and Humphrey 1977). Individual bats will occupy day roosts that are outside the cave during the swarming season. These day roosts have been documented up to 19 miles (30 km) from the cave itself in the case of a Priority 1 cave in Indiana (Hawkins et al. 2005).

(14.9 km) and 12.9 miles (20.6 km) from Snedegar and Martha caves, respectively, two Priority 3 Indiana bat hibernacula. There are no known Indiana bat maternity colonies near the Project.

While it is unknown, there may be greater numbers of Indiana bats on the landscape near North Allegheny than Beech Ridge (L. Hill, USFWS, pers. comm.). The most recent overall estimated number of Indiana bats in Pennsylvania is 1,031 based on the 2009 rangewide population estimates (USWSF 2010). The range maps in the *Indiana Bat Draft Recovery Plan: Revision 1* (USFWS 2007) confirm that Indiana bat records are widespread throughout south-central Pennsylvania. The Central Appalachian and Ridge and Valley ecoregions in south-central Pennsylvania appear to be suitable winter range for Indiana bat based on the number of counties with confirmed hibernacula (USFWS 2007), likely due to the presence of karst features[25] in these mountainous areas. Given the distribution maps in the recovery plan it is likely that the majority of the Indiana bats hibernating in Pennsylvania do so in the southern and central portions of the state.

The turbines at North Allegheny were operating at the normal 4 m/s cut-in speed when the Indiana bat mortality occurred at the North Allegheny Wind Farm. Wind speeds on the night that the fatality occurred were in the range of 7.7 and 16.5 mph (3.5 to 7.5 m/s). Similar to the Indiana bat fatalities at Fowler Ridge, the North Allegheny fatality occurred in September within what is believed to be the fall swarming season, and was a female non-reproductive individual (L. Hill, USFWS, pers. comm.).

<u>Biological Basis for Selected Turbine Cut-In Speeds During Spring Migration or Summer</u>. Available scientific information indicates that reductions in bat mortality can be achieved by implementing turbine cut-in speed adjustments during the late summer and fall (Arnett et al. 2010; Baerwald et al. 2009; Good et al. 2011). To date, no available studies have evaluated the benefits of raising turbine cut-in speeds during spring migration or early summer, largely because, as detailed below, bat mortality levels are likely to be significantly lower during spring migration and during the summer period. The Mount Storm wind project provides one of the most comprehensive data sets for monitoring wind projects in the Appalachian Recovery Unit. The average number of bat fatalities measured per turbine search was between approximately 7 and 14 times higher in the months of August and September than in the months of April and May (Table 4.10).

Given this information and the low likelihood in general of Indiana bat take, a further reduction in mortality by raising turbine cut-in speeds will be difficult, if not impossible, to meaningfully measure or detect. In addition, curtailment during spring or summer will significantly impact electric power generation without demonstrable benefits to bats. Consequently, BRE does not propose to implement cut-in speed adjustments during the spring migration period or summer. Should the initial minimization strategy fail to deliver anticipated results, BRE's Adaptive Management Plan provides for adjustments to turbine operational protocols, including the testing elevated cut-in speeds during spring migration or summer, to achieve the HCP's biological goals and objectives.

[25] Areas characterized by irregular typically subterranean erosive limestone creating sinkholes, caverns, and fissures.

Table 4.10 Bat Fatality Data from Mount Storm, West Virginia, Monitoring Studies, 2008-2010.

Month	Turbine Searches	Bat Fatalities	Average Number of Bats Found Per Turbine Search
March	153	0	0.00
April	894	12	0.01
May	1,287	28	0.02
June	959	61	0.06
July	1,213	142	0.12
August	1,723	365	0.21
September	1,656	268	0.16
October	608	58	0.10

By testing a raised cut-in speed of 10.7 mph (4.8 m/s) (slightly below 11.2 mph [5.0 m/s]) and partial-night curtailment, BRE's monitoring and adaptive management strategy is specifically designed to ascertain if reductions in estimated take can be achieved at a slightly lower cut-in speed and for a shorter period of the night (as opposed to maintaining raised cut-in speeds for the entire night). Such an adaptive management strategy will help ensure that biological goals and objectives of the HCP are achieved in a cost-effective manner. If the Curtailment Plan does not deliver the expected mortality reductions consistent with the plan's biological goals and objectives, BRE's Monitoring Plan (including carcass searches from April 1 through November 15 for the life of the Project) and Adaptive Management Plan will ensure that BRE will take actions consistent with the plan (such as implementing higher cut-in speeds or expanded curtailment windows) to meet the HCP's biological goals and objectives.

To verify the minimization benefits of the Curtailment Plan, during Year 1 of the ITP, BRE will implement an experimental design under which ten turbines will operate at full capacity year-round, ten turbines will be curtailed for the whole night for 12 weeks from mid-July to mid-October, and remaining turbines will be operating at 10.8 mph (4.8 m/s) cut in speed beginning 0.5 hour before sunset for a period of five hours (i.e., under BRE's Curtailment Plan—see the RMAMP for details). In Years 2-3 of the ITP, BRE will refine and implement turbine operational protocols that achieve or exceed the predicted minimization targets and meet the biological goals and objectives described in Section 5.0. Under this approach, by Year 4 of the ITP and for the remainder of the ITP, the estimated annual take should be reduced to 2.5 or fewer Indiana bats per year.

As noted above and detailed further in the RMAMP, BRE's avoidance and minimization strategy is based on the best available scientific information regarding documented techniques for reducing bat mortality at operating wind turbines. Furthermore, the proposed level of avoidance and minimization measures are rationally related to the impact of the take (estimated to be between 0 and 70.0 Indiana bats over the 25-year term of the ITP after implementation of avoidance measures) (see Section 4.2.1 below for details on the impacts of take on Indiana bats). Available scientific and other information indicates that efforts to further avoid and minimize potential take of Indiana bats through additional increases in the cut-in speed or an expansion of the curtailment window beyond the July 15 to October 15 fall migration period, such as the additional measures used in BRE's proposed interim take avoidance protocol, are not necessary to achieve reductions in mortality from 44 to 93% and are highly likely to produce diminishing benefits compared to the proposed Curtailment Plan.

4.1.5.3 Take Limits

After accounting for the implementation of proposed avoidance and minimization measures, BRE proposes authorization of the following take levels.

During Years 1-3 of the ITP while BRE is testing the Curtailment Plan, BRE estimates that the take of up to 5.0 Indiana bats per year could occur at a 100-turbine project, for a total estimated take of up to 13.8 individuals during the first three years of the ITP. During this period, BRE will develop baseline bat mortality estimates—i.e., mortality estimates from fully operational turbines (see Section 2.0 in the RMAMP) that will be used to judge success with meeting the biological goal of significantly reducing covered species and all bat mortality in a cost effective manner consistent with the best available science (see Section 5.0 in the HCP and Section 2.0 in RMAMP).

During Years 4-25 of the ITP, after project-wide implementation of operational protocols developed during the first three years of the ITP, BRE concludes that estimated amount of Indiana bat take can be reduced to 2.5 bats per year (50% of the take estimate), for a total estimated take of up to 70.0 Indiana bats over the entire 25-year term of the ITP (5.0 x 3 years + 2.5 x 22 years = 70.0).

BRE proposes authorized take of an aggregate of 70.0 Indiana bats over the permit term, in which case BRE will exceed authorized take if the aggregate total of the annual calculated fatality rate (including adjustments for surrogacy ratios and study biases) exceeds 70.0 Indiana bats. However, given that bat mortality will undoubtedly vary during the permit term, two thresholds will trigger further discussions between BRE and USFWS to ensure the project remains within authorized take levels:

1) In any year, if Indiana bat adjusted fatality estimates exceed 5.0, or
2) In three consecutive years, adjusted fatality estimates for all bats exceed the 90% confidence interval of baseline levels established during Years 1-3 of the ITP. Mean adjusted fatality rates will be determined for fully operational turbines; the means will have associated confidence intervals. If the mean rates documented in Years 4-25 exceed the 90% confidence intervals of the means established in Years 1-3, the threshold is met and further discussions will take place.

During Years 1-3 of the ITP, BRE will conduct intensive monitoring studies designed to estimate Indiana bat mortality based on the actual number of Indiana bat fatalities detected on-site and to establish the ratio of Indiana bat take to mortality of all bat fatalities. If no Indiana bats are detected, the ratio will be zero; however, BRE will continue to monitor for all species, and all bat adjusted fatality rates will be compared to the rates obtained during Years 1-3, so that if fatality rates increase above-and-beyond the 90% confidence interval for three consecutive years, the conservation strategy will be re-evaluated. In addition, BRE will evaluate the reliability of available surrogates for Indiana bat mortality (e.g., all bats, little brown bats, all *Myotis* species). Thereafter, during Years 4-25 of the ITP, BRE will implement a surrogate species approach to monitor take of covered species using ratios developed during the first three years of intensive study. A surrogate approach to monitoring in Years 4-25 is warranted given that (1) it is impracticable to intensively monitor for take of Indiana bats for the duration of the ITP given that such take is an extremely rare event and (2) a surrogate species monitoring approach will provide adequate monitoring levels to ensure the project remains in compliance with authorized take limits over the term of the permit. Peer review of the monitoring plan supports this conclusion.

4.1.5.4 Mitigation Strategy

In addition to the avoidance and minimization described above, BRE proposes off-site mitigation measures described in Section 5.3 that will fully mitigate for take of covered species that may potentially occur over the term of the ITP.[26] These off-site measures are designed improve the viability of Indiana bats and Virginia big-eared bats by protecting priority habitat, either winter hibernacula or summer maternity colonies or roosts. This goal may be achieved by restoring or protecting known maternity sites and/or hibernacula through purchase, establishment of conservation easements, or donation to qualified conservation organization. Collectively, these actions are intended to improve conditions relative to current conditions for Indiana bats and Virginia big-eared bats to aid with recovery of these two species. Peer review of the proposed HCP and RMAMP supports the proposed conservation strategy, including off-site land conservation.

As more fully detailed in Section 6.0, BRE proposes to establish and fund a trust account with sufficient monies to undertake a project(s) that USFWS determines satisfies the mitigation criteria established in Section 5.3.

4.1.6 Estimating Take of Virginia Big-Eared Bats

4.1.6.1 Take Estimate

There have been no documented occurrences of Virginia big-eared bat in Greenbrier or Nicholas counties or at the Project site from mist netting or other surveys (BHE 2005, 2006b; C. Stihler, WVDNR, pers. comm.). However, since the species can co-occur with other bat species and the Project falls close to the estimated range of the species (see Figure 3.2), it is possible that the species could occur in the Project area over the 25-year term of the ITP. Available information concerning the species distribution indicates that the Project could cause the take of between 0 and 1.0 Virginia big-eared bat per year.

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[26] The analysis in this HCP shows that up to 71 acres of mostly forested habitat will be permanently disturbed and 460 acres will be temporarily disturbed prior to conversion to a different vegetation/habitat types as a result of construction of the 100-turbine project, although habitat disturbance would not rise to the level of take for Indiana bats or Virginia big-eared bats.

Two wind-energy facilities have been constructed within the range of Virginia big-eared bat—the Mountaineer facility in Thomas County, West Virginia, and the Mount Storm facility in Grant County, West Virginia (see Figure 3.2). Post-construction fatality monitoring was conducted from April to November 2003 and in August and September 2004 within the Mountaineer facility, during which time a total of 941 bats were found (see Tables 4.2–4.4); none were Virginia big-eared bats (Kerns and Kerlinger 2004; Arnett et al. 2005). Fatality monitoring was conducted at the Mount Storm facility from August to October 2008, from March to June and July to October 2009, and from April to October 2010 (Young et al. 2009a, 2009b, 2010a, 2010b, 2011). A total of 935 bats was found at the Mount Storm facility during this time; none were Virginia big-eared bats.

Although there are only two projects within Virginia big-eared bat range, numerous wind-energy facilities have been constructed within Townsend's big-eared bat range (see Figure 3.3). Virginia big-eared bat is a subspecies of Townsend's big-eared bat, and it is considered likely that the two share ecological and behavior similarities that likely influence their risk to wind turbines. At the time of listing, there was little information about Virginia big-eared bat, and much of the recovery plan was based on information available for Townsend's big-eared bat (see Bagley 1984). Since the species listing, some studies have looked at foraging ecology and behavior and have found similarities between the two species. For example, Sample and Whitmore (1993) found similar food habit between Virginia and Townsend's big-eared bats, and Burford and Lacki (1995) found patterns of habitat use between Virginia and Townsend's big-eared bats to suggest that habitat use by both species was probably a function of availability and reflected behavioral plasticity in selection of foraging habitat. Adam et al. (1994) reported that subspecies of Townsend's big-eared bat foraged along canyons, cliff walls, mountain slopes, and intermittent streams, and they also observed lack of consistency in habitat use. They concluded that habitat use was likely based on availability, and this species and subspecies were flexible in choice of foraging habitat (Adam et al. 1994). While the information available comparing behavioral biology of these similar species is limited, factors that presumably influence risk such as morphology, behavior, and habitat are believed to be similar between the species and sub-species.

Although there are only two projects within Virginia big-eared bat range, numerous wind energy facilities have been constructed within Townsend's big-eared bat range (see Figure 3.3). Townsend's big-eared bat is found throughout the western U.S. as far east as the western edges of Montana, South Dakota, Colorado, Oklahoma, and Texas. Within this range, there are 28 wind energy facilities where post-construction fatality monitoring has been conducted and where the results are publically available. The total capacity of these sites is approximately 4,850 MW (American Wind Energy Association 2010). To date, no Townsend's big-eared bat fatalities have been recorded at these wind energy facilities.

4.1.6.2 Avoidance and Minimization Measures

For the life of the project, BRE will adjust the turbine cut-in speed from 7.8 mph (3.5 m/s) to 10.7 mph (4.8 m/s) for a 12-week period between mid-July and mid-October and for the time of night from 0.5 hour before sunset for a period of five hours (BRE's Curtailment Plan). BRE will also ensure that turbine rotors at the Project (both the existing GE turbines and the expansion turbines) remain fully feathered whenever wind speeds are below cut-in speed. Fully feathered blades are pitched (rotated) so that the rotor edge points directly into the wind, reducing rotor rotation speeds to less that 2 rpm. During Year 1 of the ITP, BRE will implement the RMAMP under which 18 turbines will be operating at full capacity year round, 18 turbines will be curtailed for the whole night from July 15 to October 15, and the remaining 31 (existing project) or 64 (existing project plus expansion) turbines will be operating under BRE's Curtailment Plan (see the RMAMP for details). Through adaptive management, BRE will implement turbine operational protocols that meet the biological goals and objectives described in Section 5.0. In no case will such modified operational protocols result in less protection for covered species than those set forth in Section 5.0 of the HCP (i.e., if BRE's Curtailment Plan successfully reduces bat mortality to levels that exceed expectations, BRE agrees to maintain the 10.7 mph (4.8 m/s) cut-in speed and partial-night curtailment for the duration of the ITP).

There are no data to suggest that Virginia big-eared bats are or are not equally susceptible as Indiana bats to collisions or barotrauma. Furthermore, there are no documented Virginia big-eared bat fatalities at wind projects. For the reasons stated above, the likelihood of a Virginia big-eared bat occurring on-site is low, and they are included in this HCP only because the Project is on the edge of their known range. Finally, BRE's Curtailment Plan is likely to reduce mortality of all bats species, and therefore it is likely to benefit Virginia big-eared bats.

During Years 1-3 of the ITP, BRE estimates that the take of up to 1.0 Virginia big-eared bat per year could occur at a 100-turbine project, for a total estimated take of up to 3.0 individuals during the first three years of the ITP. During this period, BRE will develop baseline bat mortality estimates that will be used to measure and achieve a reduction in covered species and all bat mortality (see Section 5.0 and the RMAMP).

During Years 4-25 of the ITP, after project-wide implementation of operational protocols developed during the first three years of the ITP, BRE concludes that estimated amount of Virginia big-eared bat take can be reduced to 0.5 bat per year, for a total estimated take of up to 14 Virginia big-eared bats over the entire 25-year term of the ITP (1.0 x 3 years + 0.5 x 22 years = 14.0).

The proposed Project may result in the aggregate take of 14.0 Virginia big-eared bats over the permit term. However, given that bat mortality will undoubtedly vary during the permit term, two thresholds will trigger conferencing with USFWS:

1) if, in any given year, Virginia big-eared bat adjusted fatality rate estimates exceed 1.0 or
2) if, for three consecutive years, all bat fatality estimates exceed baseline all bat fatalities by more than the 90% confidence interval.

During Years 1-3, BRE will conduct intensive monitoring studies designed to detect bat mortality and to establish the ratio of Virginia big-eared bat take to mortality of all bat fatalities. Thereafter, during Years 4-25, BRE will implement a surrogate approach, using all bats as a surrogate, to monitor take of covered species using ratios developed during the first three years of intensive study. A surrogate approach to monitoring in Years 4-25 is warranted given the difficulty of detecting a rare event and the fact that a surrogate approach will provide adequate monitoring levels to ensure the Project is in compliance with authorized take limits over the term of the permit. Peer review of the monitoring plan supports this conclusion.

4.2 Impacts of the Taking

4.2.1 Indiana Bat

Determining the significance of potential take on a population requires an understanding of population demographics and in particular annual survival or mortality rates. The following discussion evaluates impacts at four population levels, the local population (within 30 miles [48 km] of the Project), the West Virginia population, the Appalachian Mountain Recovery Unit population, and the national population. The discussion is based on the modeled annual take of: up to 5.0 Indiana bats per year during Years 1-3; up to 2.5 Indiana bats per year during Years 4-25; and an aggregate take of up to 70.0 Indiana bats during the permit term (5.0 x 3 years + 2.5 x 22 years = 70.0). In addition, impacts of the potential aggregated take as determined above depending largely on the overall trends in the population (e.g., increasing, decreasing), which are largely unknown over the 25-year term of the permit and are expected to change over time. For example, the latest publicly available information related to Indiana bat populations in the Appalachian Mountain Recovery Unit suggests a population increase (see Section 3.0); however, with impacts such as WNS occurring, this trend is likely to change over time to a population decrease. In any event, as indicated below, the impact of the take on the population on an annual basis is small, and the expected aggregate take over the term of the permit (70.0 Indiana bats) is immeasurable on the aggregate population as measured for the same length of time. As discussed under changed circumstances (Chapter 8.0), the response to declining populations of Indiana bats will be addressed in consultation with the USFWS, and triggers have been developed for the HCP that will allow appropriate response in the event of substantial population declines that would ensure that the authorized level of take does not appreciably reduce the likelihood of recovery and survival of the species in the wild and that the proper type and amount of mitigation is being provided.

Tree clearing and habitat conversion are not expected to rise to the level of take (Section 4.1), and thus the following discussion relates just to direct take from collision/barotrauma.

The take of up to 5.0 individuals annually from the local population (defined by the Indiana bats wintering within a 30-mile [48-km] radius of the Beech Ridge site) represents loss of approximately 0.79% of the local population (Table 4.14). The two nearby hibernacula had a total of 538 Indiana bats during the 2008 census, and the Indiana bat recovery plan (USFWS 2007) reports an additional 94 Indiana bats in caves in Greenbrier and Pocahontas counties, which occur within roughly a 30-mile (48-km) radius of the Project area.

The loss of up to 5.0 individuals annually due to the Project represents 0.033% of the West Virginia population, 0.018% of the Appalachian Mountain Recovery Unit population, and 0.001% of the national population (Table 4.14). The loss of the aggregate estimated take, 70.0 individuals, is 0.24% of the population of Indiana bats in the Appalachian Mountain Recovery Unit based on the most recent estimates (USFWS 2010c); however, this aggregate loss would not all occur in one year. In terms of recruitment, West Virginia experienced approximately a 9%

increase in Indiana bat population over the 5-year period between 2005 and 2009 (Table 3.1) (USFWS 2010c), which represents an increase of approximately 360 Indiana bats per year. The loss of up to 5.0 individuals annually represents approximately 1.4% of this annual recruitment. At the local scale, the most recent information regarding the local population sizes also suggests that the Indiana bat population has experienced an increase in recent years. Count data from Snedegar and Martha caves have increased from 287 to 304 and 251 to 285, respectively, from 2007 to 2008 (C. Stihler, WVDNR, pers. comm.). This represents an increase of approximately 50 bats per year or an approximate 6% and 13% increase in these two caves, respectively, or a 9% increase cumulatively over the past two years. The loss of up to 5.0 individuals annually represents 10% of the annual recruitment for the Snedegar and Martha caves populations.

The highest percent loss estimate, 0.79% to the local population (Table 4.14), is well within the pre-WNS range of background mortality estimated for Indiana bats (see above; USFWS 2007) and is a small fraction of variation in annual mortality for Indiana bats. Also, the estimated annual loss represents a small fraction of the estimated annual recruitment of Indiana bats at the population scale that is expected to be impacted. At this level of potential impact, the estimated take of Indiana bats due to the Project will not have a measurable effect on the local, statewide, or regional population of Indiana bats. WNS-caused population declines are treated as a changed circumstance and are discussed in Section 8.2.1.

This analysis assumes that impacts are equally distributed between males and females (Arnett et al. 2008). While impacts to adult females may be considered greater to a population of Indiana bats, the impact to females is essentially one-half of the estimated impact and still well within the expected background mortality of the population potentially affected. Although the fatality of a female could also result in the loss of a juvenile, it is not likely at the Project site due to the lack of potential maternity colony habitat.

Table 4.11 Percent Loss of Indiana Bat Populations Based on Estimated Take of Indiana Bats from the Beech Ridge Wind Energy Facility.

Population	Definition	Population Estimate (no. bats)	Take Estimate (no. bats/yr)	Annual Population Loss (%)	Reference(s)
Local	Hibernacula within 30-mile (48-km) radius	632	0.0-5.0	0.0-0.79	USFWS 2007, C. Stihler, WVDNR
West Virginia	Statewide estimate from hibernacula counts	14,855	0.0-5.0	0.0-0.033	USFWS 2010c
Regional	Appalachian Mountain Recovery Unit	27,458	0.0-5.0	0.0-0.018	USFWS 2010c
National	Species rangewide	387,835	0.0-5.0	0.0-0.001	USFWS 2010c

BRE estimates that up to 70.0 Indiana bats could be taken over the 25-year term of the ITP. BRE proposes adaptive management provisions to be implemented based on the threshold triggers described above or changed circumstances provisions, if population-level impacts of the take change over time. Given that the aggregated take will be spread across 25 years, BRE believes it appropriate to evaluate estimated annual take relative to current local and regional population levels to assess the impacts of taking. Regardless, the loss of 70.0 individuals relative to the current size of the Appalachian Mountain Recovery Unit (27,458) would not appreciably reduce the Appalachian Mountain Recovery Unit's current size.

4.2.2 Virginia Big-Eared Bat

Estimates developed for this HCP are that up to 1.0 Virginia big-eared bat could be lost annually from a 100-turbine project (see Section 4.1.6) or an aggregate of approximately 14.0 individuals over the life of the permit in the absence of avoidance and minimization strategies. If this take were to occur, it is unknown which population the loss would be attributable to, as the Project is on the periphery of the estimated range of Virginia big-eared bat in West Virginia between the central and northern populations (see Figure 3.2). The loss of 1.0 individual annually from the West Virginia population represents an annual mortality rate of less than 0.01% (see Table 3.3 for the West Virginia population estimate). The aggregate take of 14.0 individuals represents a mortality rate of 0.13% if it were to occur all in one year based on the current estimated population size. Loss is well within the range of background mortality estimated for Townsend's big-eared bats (see Chapter 3.0 above) and is an immeasurable fraction of the variation in annual mortality. Also, the estimated annual loss represents a small fraction of the estimated annual recruitment of Virginia big-eared bats at the West Virginia state population scale (see Table 3.3). The estimated take of Virginia big-eared bats due to the Project will not have a measurable effect on the local, statewide, or regional population of Virginia big-eared bats, nor will this loss measurably reduce the likelihood of recovery of the species.

BRE proposes adaptive management provisions to be implemented based on the threshold triggers described above or changed circumstances provisions, if population-level impacts of the take change over time. Given that the aggregated amount of overall take will be spread across 25 years, BRE believes it appropriate to evaluate estimated annual take relative to current local and regional population levels to assess the impacts of taking. Regardless, the loss of 14.0 individuals relative to the current size of the West Virginia population (11,092) would not measurably reduce this population's current size.

5.0 CONSERVATION PLAN

As described in the HCP Handbook (USFWS and NMFS 1996), conservation or mitigation actions under HCPs usually take one of the following forms: (1) avoiding the impact (to the extent practicable); (2) minimizing the impact; (3) rectifying the impact; (4) reducing or eliminating the impact over time; or (5) compensating for the impact. For example, project effects can be (1) avoided by relocating project facilities within the Project area; (2) minimized through timing restrictions and buffer zones; (3) rectified by restoration and revegetation of disturbed Project areas; (4) reduced or eliminated over time by proper management, monitoring, and adaptive management; and (5) compensated by habitat restoration or protection at an on-site or off-site location. In practice, HCPs often use several of these strategies simultaneously or consecutively. Ultimately, the level of mitigation provided in an HCP must be reasonably capable of being undertaken, and both commensurate and rationally related to the level of take under the plan.[27]

The following HCP focuses on avoiding and minimizing potential impacts to Indiana bats within the Project area; the measures developed for Indiana bats will also avoid and minimize impacts to Virginia big-eared bats and all bats. In addition, BRE proposes to mitigate for unavoidable impacts to Indiana bats—and by association Virginia big-eared bats and all bats—through implementation of habitat restoration or protection measures within the Appalachian Mountain Recovery Unit (USFWS 2007), which is the population of Indiana bats determined by BRE to be potentially impacted by Project operations (Chapter 4.0).

5.1 Biological Goals and Objectives of the HCP

The biological goals of the HCP are as follows.

1. Significantly minimize bat mortality consistent with the best available scientific information.
2. Avoid/minimize potential take of covered species over the term of the ITP by implementing wind project turbine operational protocols learned through the RMAMP in consultation with USFWS.
3. Mitigate unavoidable impacts to covered species by implementing habitat restoration or protection measures in key Indiana bat habitats within the Appalachian Mountain Recovery Unit

To achieve the biological goal to significantly minimize bat mortality consistent with the best available scientific information (Goal 1), BRE will 1) implement the RMAMP and, during the first three years of the ITP, determine baseline bat mortality conditions at the project and identify turbine operational protocols that will reduce bat mortality during periods of high activity and 2) implement BRE's Curtailment Plan that, based on the best available science, should reduce bat fatalities by 44-93% (Arnett et al. 2010) in a cost-effective manner.

To achieve the biological goal of minimizing take of covered species over the term of the ITP (Goal 2), BRE will implement monitoring and adaptive management measures contained in the RMAMP. These measures are intended to detect take of the covered species and/or changes in

[27] *See National Wildlife Federation v. Norton*, 306 F.Supp.2d 920 (E.D. CA, February 4, 2004).

bat mortality over the term of the ITP and to permit BRE to implement operational protocols to ensure that BRE does not exceed the authorized level of take of covered species provided in the ITP. The take estimate prior to implementation of the operational protocols is 5.0 Indiana bats and 1.0 Virginia big-eared bat; again, the best available science suggests that implementation of operational protocols should achieve a 44-93% fatality reduction.

To achieve the biological goal of mitigating unavoidable impacts to covered species (Goal 3), BRE will select and implement habitat restoration and protection projects that satisfy the mitigation criteria enumerated in this section. To the extent such measures are not in place prior to a permit decision, BRE will establish a trust fund account to ensure that mitigation is implemented.

5.2 On-Site Conservation Measures

5.2.1 Project Design and Planning

BRE conducted wildlife studies during development of the Project and concluded that Indiana bats were unlikely to occur within the Project site (BHE 2005, 2006b). Available data, including on-site surveys, indicate the probable absence of wintering habitat or maternity colonies at the Project site. Mist-netting in 2006, 2006, and 2010 did not capture any Indiana bats. Acoustic data collected in 2005 and 2010 suggest that Indiana bats may infrequently occur on-site. Based on these studies, Project construction and operation presents a low risk to Indiana bats (BHE 2006a).

The original design of the Project was for construction and operation of 124 turbines at the site. As a result of discussions and negotiations with environmental organizations as reflected in a January 26, 2010, settlement agreement,[28] the Project was reduced from 124 turbines to 100 turbines, and turbine sites within the eastern portions of the Project, those closest to the known Indiana bat hibernacula (Snedegar and Martha caves), historical hibernacula (Bob Gee Cave), and the proximate area where many caves occur (BHE 2006a) were eliminated from the Project. Prior to these design changes, the nearest turbine to the hibernacula was approximately 6.0 miles (9.7 km) (Snedegar Cave) and 9.0 miles (14.5 km) (Martha Cave) (BHE 2006a). After design changes, this distance increased to 9.3 and 12.9 miles (14.9 and 20.6 km), respectively. These Project siting and design measures help avoid and minimize potential take of Indiana bats by reducing the overall risk associated with project size (number of turbines) and by increasing the distance between known bat hibernacula and the Project, assuming that projects farther away from known concentrations of Indiana bats are less likely to have Indiana bats roosting on-site, swarming on-site, or migrating/passing through the site. The Indiana bat home ranges include the area within 10 miles (16 km) of a hibernaculum) (L. Hill, pers. comm., January 2011); 14 of the turbines at the Project area are located between 9 and 10 miles (14 and 16 km), at the outer edge of the home range, of the Snedegar Cave Indiana bat population.

[28] *See Animal Welfare Institute, et al. v. Beech Ridge Energy LLC, et al.,* No. RWT 09cv1519 (S.D. MA January 26, 2010).

5.2.2 Project Construction

To avoid potential take of roosting Indiana bats, tree clearing for the 33-turbine phase will occur when Indiana bats are not expected to be within the Project area. BRE commits to limiting its tree clearing during construction of the expansion to the period between November 15 and March 31 when bats expected to be hibernating and not active in the project area, except that up to 15 acres may be cleared between April 1 and May 15 or between October 15 and November 14 as described above (see Sections 2.1.4.5 and 4.1.1.). BRE conducted mist-netting surveys on the proposed expansion area according to USFWS guidelines to ensure that tree clearing outside the winter period would not result in take of Indiana bats (Young and Gruver 2011).

5.2.3 Project Operations

For term of the ITP, BRE will adjust the turbine cut-in speed from 7.8 mph (3.5 m/s) to 10.7 mph (4.8 m/s) for a 12-week period from mid-July to mid-October and for the time of night from 0.5 hour before sunset for a period of five hours (BRE's Curtailment Plan). If BRE's research and monitoring results (see RMAMP, Appendix C) demonstrate that more restrictive operational protocols are needed to achieve Biological Goals 1 and 2, the Curtailment Plan/turbine operational protocols will be modified per the adaptive management plan presented below. On the other hand, if BRE's Curtailment Plan successfully reduces bat mortality to levels that exceed expectations, BRE agrees to maintain the 10.7 mph (4.8 m/s) cut-in speed and partial-night curtailment for the duration of the ITP. BRE's Curtailment Plan will only be modified with the written agreement of USFWS and according to procedures identified in this HCP as well as the permit and IA. Changing turbine cut-in speeds during this period of the year will help avoid key periods of bat activity around the project, thus reducing potential take of covered species and all bat species.

5.2.4 Project Operations Research, Monitoring, and Adaptive Management Plan

BRE will implement an RMAMP (Appendix C) designed to develop an optimal project operation regime for minimizing potential take of Indiana bat and Virginia big-eared bat. The overall goals of the RMAMP include the following.

1. Evaluate the effectiveness of BRE's Curtailment Plan and other turbine operational protocols (e.g., changing turbine cut-in speeds during various times of the night) to achieve Biological Goals 1 and 2 (research component).

2. Through post-construction monitoring, refine estimates of the amount of all bat fatalities, identify the circumstances and conditions under which fatalities occur (monitoring component), and continue to determine the most effective operational protocols for achieving Biological Goals 1 and 2. The first three years of the RMAMP implementation will include intensive monitoring using methods recommended for wind project monitoring (e.g., WTGAC 2010), daily casualty searches at 30 Project turbines, and surveys to measure potential biases (searcher efficiency, carcass removal, carcass distribution). Intensive monitoring may continue beyond three years if HCP goals have not been met. Annual monitoring during interim years (see Section 3.2.4 in the

RMAMP) will be less intensive but will involve formal carcass searches to be conducted weekly at 24 turbines, will be conducted by trained personnel, and will also be designed to ensure that avoidance/minimization strategies put in place during intensive studies are functioning effectively.

3. Evaluate the research and monitoring results to either deem the avoidance/mitigation strategies successful at achieving Biological Goals 1 and 2 or to refine the research and monitoring to attain the these goals. It is BRE's intent that the avoidance/minimization strategies will be deemed successful after Year 1; however, the adaptive management strategy contained in the RMAMP allows for modification to operational protocols to improve and refine the avoidance/minimization strategy in successive years of the ITP.

Previous studies have documented that the majority of bat fatalities at wind turbines occur during low wind speeds during late summer and fall migration periods (Arnett et al. 2008). There are five known turbine operation/bat fatality studies conducted to date, three from the U.S. (Good et al. 2011; Arnett et al. 2010; Young et al. 2011), one from Canada (Baerwald et al. 2009), and one from Germany (O. Behr, University of Erlangen, unpublished data). Four of the studies evaluated the effects of increasing the wind speed at which turbines blades begin producing power (the turbine cut-in speed) on estimated bat fatalities. Two of the studies evaluated the effects of feathering the turbine blades below the cut-in speed. All of the studies indicate that the number of bat fatalities can be reduced by curtailing operations (raising cut-in speeds or partially feathering blades) at low wind speeds. Under the RMAMP, BRE will conduct similar studies focused on the Indiana bat and all bat species, thus identifying how turbine operational protocols can be used to reduce Indiana bat and all bat fatalities.

At the conclusion of three years of intensive monitoring, BRE will implement the turbine operational protocols that achieve Biological Goals 1 and 2 facility-wide on an ongoing basis, including operating the Project so as to not exceed the take authorized under the permit.

BRE is requesting authorized take for this project of an aggregate of 70.0 Indiana bats and 14.0 Virginia big-eared bats (based on adjusted fatality estimates) over the Permit Term, in which case BRE will not be out of compliance with the permit take authorization unless take exceeds these limits. However, given that bat mortality will undoubtedly vary during the Permit Term, two thresholds will trigger a meet and confer with USFWS:

1) if, in any given year, Indiana bats fatality estimates exceed 5.0 or Virginia big-eared bat fatality estimates exceed 1.0 or
2) if, for three consecutive years, all bat fatality estimates exceed baseline all bat fatalities by more than the 90% confidence interval.

Conferring will include analysis of adaptive management actions described in the RMAMP to reduce fatalities of covered species, and, by association, all bats.

In addition to the three years of intensive research and monitoring, annual monitoring will be completed as described in the RMAMP (Appendix C). Annual monitoring has been designed to measure the level of impact to birds and bats from the facility and to confirm that no major changes have occurred in terms of direct impacts (fatalities) from the first three-year intensive monitoring program. Major changes are defined as a statistically significant increase in the mean adjusted fatality rates for all bat species from the mean adjusted fatality rates measured during the first three years of study (see Section 4.0 in the RMAMP). Annual monitoring will include weekly fatality monitoring in each year of the ITP to detect changes in all bat fatalities and to correlate annual monitoring with intensive monitoring results. In the event that a major change is documented during any year of the ITP, BRE will consult with the USFWS regarding the need for intensive monitoring and implementation of further avoidance/minimization measures. Adaptive management processes are described in detail in the RMAMP.

BRE will document, in annual reports to USFWS, that the on-site avoidance/minimization measures have been implemented and that research and monitoring are being conducted (Appendix C, RMAMP).

5.3 Off-site Habitat Conservation

BRE has developed operational and construction protocols to avoid and minimize the majority of potential project impacts. Nevertheless, potential impacts associated with the project may result from the take of listed bat species associated with wind turbine operations. Over the ITP term, BRE estimates that 70.0 Indiana bats and 14.0 Virginia big-eared bats may be taken as a result of project activities. The impacts of this take will be addressed through offsite conservation measures.[29]

To mitigate, BRE proposes to fund specific off-site conservation projects for Indiana bat and Virginia big-eared bat. The goal of these projects will be to contribute to the conservation of Indiana bats and Virginia big-eared bats by protecting priority habitat, either winter hibernacula or summer maternity colonies or roosts, consistent with applicable species recovery plans.

During the development of this HCP, BRE worked with USFWS and WVDNR to identify specific conservation projects that could be undertaken as a part of this HCP. One conservation project was recently identified by the USFWS that may meet the goals, objectives, and criteria identified below. Preliminary discussions with the landowner indicate that the parcel may be available for acquisition on acceptable terms. This particular parcel contains high-quality intact forest, a small hibernaculum, and possibly multiple caves. These caves may be used by Indiana bats and several other species (including little brown bat and northern long-eared bat) and currently are not impacted by white-nose syndrome. The potential also may exist to annex this parcel to an existing state wildlife refuge. BRE will continue to pursue this mitigation project in consultation with USFWS. At this time, BRE has not been able to complete its acquisition of this parcel. BRE will continue to work with USFWS and WVDNR to pursue the parcel;

[29] The analysis in this HCP indicates that about 71 acres of mostly high elevation forested habitat of limited conservation value (because of on-going management for timber production by the landowner) will be permanently disturbed and about 460 acres will be temporarily disturbed prior to conversion to different vegetation/habitat types as a result of construction of the 100-turbine project. Since this habitat is rarely or unlikely to be used or occupied by listed species and is not of unique quality or nature, this habitat disturbance is not likely to result in harm or take of Indiana bats or Virginia big-eared bats. As such, no mitigation is required to compensate for habitat loss or alteration.

however, in the event that BRE is unable to acquire the mitigation project described above BRE will acquire an alternative mitigation project.

BRE, in consultation with USFWS, has developed mitigation criteria that serve as sideboards for acceptable conservation projects to be undertaken and completed within two years of permit issuance. USFWS written concurrence that the project satisfies these criteria is necessary before BRE can undertake the mitigation project or seek disbursement of funds from its mitigation trust account (see Section 6.0).

For Indiana bats, BRE may achieve the goal by implementing one of the following three options:

- Option 1: acquiring ownership rights (e.g., fee simple, lease, conservation easement) in known hibernacula
- Option 2: acquiring ownership rights in a known maternity area
- Option 3: funding implementation of a gating project at a known hibernacula.

BRE may proceed to Options 2 and 3 upon a showing that previous options are not possible to complete within the time period specified (above/below). For Virginia big-eared bats, BRE will achieve the goal by funding implementation of a gating project at a known hibernacula. The mitigation project requirements, criteria, and expected benefits for these options are described below.

5.3.1 Requirements for All Mitigation Projects

For the purposes of mitigation, the term "mitigation project" has a specific meaning in the HCP. For mitigation, habitat or land protection means the acquisition of a real property interest in perpetuity, with appropriate restrictions to conserve the species and its habitat. BRE will choose the means of land protection, either fee acquisition with restrictions and subsequent donation to a third-party conservation steward or a conservation easement.[30]

Since the grantee or holder of the protected property interest has not yet been identified, it was not possible to develop a draft conveyance or conservation easement. Template language, required by the USFWS to be included in any conveyance or conservation easement, is provided in Appendix H. Also, state laws vary with respect to the structure, purpose, content, and enforceability of easements and real property conveyances. Additionally, land protection necessarily involves multiple parties.

The following mandatory provisions will apply to any acquisition:

1. Standard recitals that identify the parties, applicable provisions of state law, description of property, intent to bind parties, etc.

[30] Unless used in connection with a fee acquisition or conservation easement, deed restrictions and restricted covenants are disfavored as a land protection tool. In many states, deed restrictions or restrictive covenants are of limited duration, can be readily invalidated, and do not afford third-party beneficiary rights. Only under the most extenuating circumstances would they be considered, and then only with USFWS approval after consultation with the Office of the Solicitor.

2. Additional recitals describing the relationship between the conveyance to the HCP and ITP and referencing the dates each is executed; the authority and role of the USFWS; and the HCP species that is subject of the conveyance and date it is listed.
3. The stated purpose of the easement or deed transfer, mainly the conservation of the HCP species and its habitat. Secondary purposes to allow the restoration or maintenance of a habitat type or other species may be permitted so long as they do not interfere with or diminish the values established for the covered species.
4. Processes for enforcement including damages, restoration, or other remedies at law.
5. Third party beneficiary rights for the USFWS to access the property and to enforce the terms of the conveyance.
6. A requirement that the conveyance be recorded in the land records of the county, parish, or other jurisdiction in which the land is located.
7. That restrictions or easement terms are binding in perpetuity, regardless of species listing status.
8. A number of other provisions required by the USFWS, such as those dealing with: assignment, transfer, extinguishment, modification of the conveyance; interpretation and severability; and government permits and eminent domain.
9. All real property conveyances must include prohibitions on following uses:

   Industrial use
   New residential construction
   Commercial use
   Agricultural use
   Vegetative clearing
   Subdivision
   Utilities (except for existing encumbrances)[31]
   Littering or dumping
   Burning of waste or open fires
   Disposal of hazardous waste
   Grading, mineral use, excavation, dredging
   Placement of spoils
   Development rights extinguished

10. All real property conveyances must include prohibitions on the following uses, which may be tailored to maintain or restore the values of the conservation area, or a species' needs:

   Signage
   Construction
   Fencing
   Hunting/Trapping/Collection

[31] BRE will identify existing encumbrances on properties to be acquired. Doing so will allow the USFWS to determine whether existing rights-of-way or other encumbrances (e.g., mineral estates) interfere with the intended conservation values and purposes of the proposal. This critical evaluation of underlying encumbrances will be further memorialized in the ITP and IA.

Pesticide, Herbicide
Pets
Mechanized vehicles/equipment

11. The grantor of the real property interest may also want to retain Reserved Uses, so long as they do not interfere with the purpose for which the conservation interest is acquired. The following reserved uses may be acceptable if properly conditioned: passive recreational use, educational use, and selective vegetative management.

The specific terms of the provisions are provided in the IA (Appendix F).

5.3.2 Indiana Bat Mitigation

Option 1 – Fund acquisition and protection of a hibernacula

Under Option 1, BRE may fund the protection (through fee title acquisition or conservation easement) of an Indiana bat hibernacula and adjacent high quality habitat that protects the hibernacula from ongoing and future adverse threats and land management activities in perpetuity. Project criteria are as follows:

1. The project should be located within the Appalachian Mountain Recovery Unit.
2. The site should be a Priority 1, 2, 3, or 4 hibernaculum that supports Indiana bats. Preference will be for caves that are not infected by WNS, currently support multiple bat species, and support at least 70 Indiana bats.
3. In addition to the cave itself, a minimum of 0.25-mile (0.41-km) buffer around each cave entrance for the hibernaculum must be protected, which equals approximately 126 to 160 acres, respectively, per hibernaculum (assuming, based upon natural features, either circular or rectangular protection around one opening as the central point). For multiple entrance hibernacula, the main entrance would be protected. A threats analysis of the other entrances would be conducted and cave gates would be installed if it is determined that gates would remove or reduce threats. Depending on the context of the surrounding landscape, larger buffers may be warranted to remove threats to roosting and foraging habitat from logging, urban development, mining, road construction, and other activities.
4. Cave must have a general threats analysis conducted indicating that surrounding land management practices may adversely affect bats in the cave. The threats analysis will utilize readily available existing information or information available from the landowner regarding current and potential future conditions and activities within and surrounding the cave. Removal of such threats will help to ensure that bats in the cave survive and that there is an adequate buffer of habitat such that bats leaving the cave do not have to travel far to find abundant roosting and foraging habitat.
5. Cave must have a non-federal landowner (public or private) that is willing to sell the property and/or a protective easement.
6. Focus should be on hibernacula that are not already in public ownership or have no perpetual protective easements in place.
7. If human activity poses a threat to bats in the cave, then cave entrances must be gated in conjunction with the easement or land acquisition.

8. New land owner or easement holder must be willing to protect and maintain the hibernacula so that it continues to serve as a hibernacula for bats.
9. Easement or land acquisition must account for all encumbrances (e.g., utility easements, mineral rights, etc.). USFWS will need to evaluate the parcel to ensure any encumbrances do not defeat the purpose of the acquisition.
10. Preparation of a hibernaculum protection plan that will determine the actual protection measures necessary to protect the hibernacula will be developed and referenced in the conveyance document.

By protecting a Priority 1, 2, 3, or 4 hibernaculum that supports Indiana bats and removing threats that affect survivorship, the long-term survival of the population in the cave remains stable or increases. Protection of such caves in perpetuity would thus not only increase the likelihood that bats in the cave survive over time and continue contributing to the local population; it would also help to offset the impacts of the potential take of the bats during the operation of the wind farm. Protecting the cave in perpetuity will mitigate the potential effects of take during the 25-year permit despite the low reproductive capacity of the Indiana bat.

<u>Option 2 – Fund acquisition and protection of maternity area</u>

Option 2-Maternity Colony Protection and Roost/Foraging Habitat Enhancement. In the event that Option 1 cannot be achieved, BRE will fund the acquisition or purchase of a conservation easement to protect Indiana bat maternity areas in perpetuity, including roosting or foraging habitat; implementing silvicultural measures to create corridors between known roosting habitats; improving known foraging areas; or reforesting woodlots (blocks of habitat). Project criteria are as follows.

1. Mitigation projects will occur at sites that are known to be used by Indiana bats (i.e., documented roost trees present) or assumed to have a very high likelihood of being used based on proximity to known roosting, foraging, sites (e.g., within 2.5 miles [4.1 km] of known colonies).

2. Suitable habitat may consist of roosting or foraging habitat, reforestation of corridors between known roosting habitat, reforestation foraging areas, or reforestation of woodlots (blocks of habitat).

3. Ability to manage a sustainable supply of roost trees (e.g., creating snags in areas where snags are limiting).

4. Mitigation projects must be contiguous habitat and in an amount agreeable to both USFWS and BRE.

5. Mitigation projects will occur within the Appalachian Mountain Recovery Unit.

6. Projects will be conducted where summer habitat is located.

Average maternity colony size is 60 to 80 reproductive females (USFWS 2007). By protecting a known Indiana bat maternity colony and removing threats that affect survivorship, the long-term survival of the population in the maternity colony remains stable or increases. Protection of such maternity colonies in perpetuity would thus not only increase the likelihood that bats in the maternity colony survive over time and continue contributing to the local population; it would also help to offset the impacts of the potential take of the bats during the operation of the wind farm. Protecting the maternity colony in perpetuity will mitigate the potential effects of take during the 25-year permit despite the low reproductive capacity of the Indiana bat.

Option 3 – Fund implementation of a hibernacula gating project

Under Option 3, BRE may fund implementation of a hibernacula gating project that protects Indiana bats from human disturbance in perpetuity. Project criteria are as follows:

1. The project will be located within the Appalachian Mountain Recovery Unit.
2. Must be a Priority 1, 2, 3, or 4 hibernaculum that is known to support Indiana bats. Preference will be for caves that are not infected by WNS, support multiple bat species, and support at least 70 Indiana bats.
3. Cave must have threats analysis conducted indicating that human activity offers a threat to bats in the cave
4. Cave must have a landowner (public or private) that is willing to have the project implemented and can ensure implementation of the gate maintenance plan. The USFWS or a third party should have future access to the site to monitor bat populations and/or use of the cave.
5. If there are multiple cave entrances for a hibernaculum, each entrance should be gated.
6. Preparation of a hibernaculum protection plan.

By protecting a Priority 1, 2, 3, or 4 hibernaculum that supports Indiana bats and removing threats that affect survivorship, the long-term survival of the population in the cave remains stable or increases. Protection of such caves in perpetuity would thus not only increase the likelihood that bats in the cave survive over time and continue contributing to the local population; it would also help to offset the impacts of the potential take of the bats during the operation of the wind farm. Protecting the cave in perpetuity will mitigate the potential effects of take during the 25-year permit despite the low reproductive capacity of the Indiana bat.

5.3.3 Virginia Big-Eared Bat Mitigation

For Virginia big-eared bats, BRE will achieve the goal by funding implementation of a gating project at a known hibernacula that protects Virginia big-eared bats from human disturbance in perpetuity. Project criteria are as follows:

1. The project will be located within the area occupied by the same genetically isolated population where the impact occurred.
2. Must be a hibernaculum that is known to support at least 14 Virginia big-eared bats. Preference will be for caves that support multiple bat species.
3. Cave must have threats analysis conducted indicating that human activity offers a threat to bats in the cave.
4. Focus will be on a hibernaculum that is not already in public ownership or has no perpetual protective easements in place.
5. If there are multiple cave entrances for a hibernaculum, each entrance should be gated.
6. Preparation of a hibernaculum protection plan.

By protecting a Priority 1, 2, 3, or 4 hibernaculum that supports Virginia big-eared bats and removing threats that affect survivorship, the long-term survival of the population in the cave remains stable or increases. Protection of such caves in perpetuity would thus not only increase the likelihood that bats in the cave survive over time and continue contributing to the local population; it would also help to offset the impacts of the potential take of the bats during the operation of the wind farm. Protecting the cave in perpetuity will mitigate the potential effects of take during the 25-year permit despite the low reproductive capacity of the Virginia big-eared bat.

5.3.4 Conservation Fund

Other specific terms of the conservation fund and its administration include the following:

Payment Terms. Within ninety (90) days following issuance of the ITP, BRE will make payment of $785,500 to a segregated conservation fund administered by a third party selected by BRE and USFWS. BRE will work, in consultation with the USFWS, to secure a project that achieves the expected biological benefits.

BRE has evaluated a variety of projects, and the proposed payment amount would cover the most expensive option of projects that would achieve the biological goals of the HCP. However, it is recognized that the cost of a project that achieves the biological goals could vary from the estimate based on unknown factors. If a project is implemented at a lower cost, the unused portion of the fund will be refunded to BRE. If additional funds are required to implement the selected project, BRE will add an additional amount as necessary to the fund.

Administration. The conservation fund will be administered by a USFWS-approved interest bearing escrow agent or qualified conservation organization (such as Bat Conservation International or the National Fish and Wildlife Foundation). Fees associated with fund administration will in no way diminish the amount of the conservation fund. To ensure this, the administrator will directly bill BRE for associated fees and costs or include them as upfront costs in addition to the corpus of the fund, at the time the fund is established.

Eligible Projects. Money will be disbursed from the conservation fund at the direction of USFWS to fund projects that meet the goals, objectives, and criteria identified above. In accordance with the terms of the IA, projects will be identified and implemented within 12 months after permit issuance.

Reporting. BRE will submit to USFWS by April 30 of each year an annual report detailing expenditures made during the preceding calendar year and the current balance of the funds. The conservation fund administrator and BRE will each certify the accuracy of information contained in this report. These reports are intended to help USFWS ensure that adequate funding will be provided to implement the HCP and that funding sources at the required annual levels are reliable and will meet the purposes of the HCP.

Basis for Bat Conservation Fund Amount. BRE estimates that up to 70.0 Indiana bats and 14.0 Virginia big-eared bats may be taken during the 25-year permit term. Mist netting and other surveys have not identified any priority bat habitats on covered lands (e.g., winter hibernation or summer maternity colonies), and disturbed habitat is common within the region (see Section 3.1). Therefore, permanent habitat disturbance associated with Project construction is not expected to measurably increase the Project's estimated level of take of Indiana bats or Virginia big-eared bats.

To identify potential conservation projects, BRE consulted with USFWS and WVDNR and identified maternity areas and hibernacula on private lands ranging in size between 60 and 450 acres. These key areas currently produce between 12 and 12,000 Indiana bats annually. Information concerning these key conservation areas resides at USFWS; however, due to the need to protect the location of these areas from disturbance, these locations are withheld from disclosure in this HCP.

Using the acreages associated with these specific conservation areas, BRE estimates that it can protect a key maternity area or hibernacula on private land within the Appalachian Mountain Recovery Unit by acquiring approximately 200 to 300 acres at a cost of about $2,000 per acre or less. BRE estimates that the transaction costs associated with such an acquisition will be approximately $70,500, including a property survey, recording, Phase I environmental assessment, and title insurance. BRE will seek to transfer ownership and management responsibility for the off-site conservation property to a government entity such as US Forest Service, WVDNR, or a qualified conservation organization. Based on discussions with conservation organizations active in West Virginia, BRE estimates that, in the event that it ends up maintaining ownership of the off-site conservation property, the annual management costs for the off-site conservation property should be approximately 15% of the acquisition costs, or $90,000 over the life of the ITP.

BRE agrees that the annual management costs will cover property management tasks, preserving general habitat functions for the species, maintenance and installation of cave gates to prevent human access (in the event the project is cave protection), timber management for roost trees (in the event the project is maternity habitat protection), and monitoring for species benefits.

Based on these estimates, BRE concludes that at a cost of $785,500 or less, including transaction costs and a management fund, it could acquire or otherwise protect about 300 acres suitable habitat that would result in the production of more than 70.0 Indiana bats and other bats species per year, using current cave counts and other estimates. This amount of habitat would also be sufficient to protect an assemblage of maternity trees plus a buffer or a cave entrance or entrances plus a buffer. In addition, BRE will provide $25,000 to fund additional Virginia big-eared bat habitat restoration projects, in the event the selected conservation project does not also benefit Virginia big-eared bat.[32]

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[24] On June 15, 2011, Laura Hill, USFWS Elkins Field Office, identified high priority mine portal gating needs at the New River National Park that cost $10,000 to $15,000. Funding two of these projects would adequately mitigate for take of Virginia big-eared bats associated with this HCP.

5.4 Monitoring and Reporting Program

The RMAMP, which includes monitoring and reporting, is described in Section 5.2 and presented in detail in Appendix C.

6.0 FUNDING ASSURANCES

The ESA implementing regulations provide that an applicant for an ITP must establish that sufficient funding will be available to implement the HCP, including the requirements to monitor, minimize, and mitigate the impacts from the proposed taking.

Measures requiring funding in an HCP typically include on-site measures during project implementation or construction (e.g., monitoring, surveys, research), as well as on-site and off-site measures required after completion of the project or activity (e.g., re-vegetation of disturbed areas and acquisition of mitigation lands). For relatively small to medium-sized projects involving only one or two applicants, the funding source is usually the permittee, and funding is provided immediately before project activities commence, immediately after, or in stages.

BRE will provide two separate assurances that proposed research and monitoring activities contained in the RMAMP will occur. First, concurrent with permit issuance, BRE will provide USFWS with evidence that it has signed a contract for the first year of monitoring and reporting. Additionally, within one year of ITP issuance, BRE will provide one or more irrevocable, non-transferable standby letters of credit issued by (i) a U.S. commercial bank or (ii) a U.S. branch of a foreign commercial bank with sufficient assets in the U.S., as determined by USFWS, with either such bank having a credit rating of at least A- from S&P or A3 from Moody's in the amount of $1,580,400. BRE will maintain this financial assurance for the duration of the ITP and provide USFWS of evidence of its establishment. The amount of financial assurance is based on the estimated RMAMP implementation costs for Years 1-3 of the ITP, including the intensive monitoring effort, the ongoing monitoring effort, mowing, and reporting (see Table 6.1 for details).

Prior to and after issuance of the ITP, BRE identify a specific off-site conservation project(s) that satisfy all the mitigation criteria identified in Section 5.3 above. Initial conservation projects have been identified; however, negotiations with willing parties may take several months to conclude and may not be completed by the time of ITP issuance. BRE will continue to pursue such projects in consultation with USFWS and WVDNR in the near-term. However, in the event an acceptable conservation project cannot be implemented upon ITP issuance, BRE will establish a trust fund in the amount of $785,500 to facilitate such conservation actions during the term of the ITP. In the event BRE establishes a fund, BRE will select an acceptable fund administrator identified in consultation with USFWS to manage and administer the conservation fund in a segregated account for the benefit of covered species. BRE will contribute one hundred percent of the $785,500 within 90 days of issuance of the ITP, so no ongoing financial security will be required to guarantee its fulfillment of this obligation. As described above, USFWS must concur that the selected project(s) satisfy the requirements of Section 5.3 before BRE may direct monies be disbursed.

Other specific terms of the conservation fund and its administration include the following:

<u>Administration</u>. The conservation fund will be administered by a USFWS-approved escrow agent or qualified conservation organization (such as Bat Conservation International or the National Fish and Wildlife Foundation). Fees associated with fund administration will be paid

separately by BRE and not materially diminish the amount of the conservation fund. Funds may be held in an interest bearing account, the interest of which can be used to for the administration of fees and the purposes for which the fund was created, or return to BRE upon completion of the mitigation. Any funding agreement must specify that funds may not be co-mingled with other funds or accounts and may not be placed in an investment or portfolio-based account.

If mitigation projects are implemented at a lower cost, the unused portion of the fund will be refunded to BRE. If the estimated mitigation cost is insufficient and additional funds are required to implement a project(s) consistent with the requirement of Section 5.3, BRE will make the contribution(s) as necessary).

<u>Timeline for Disbursement and Project Implementation</u>. Projects will be identified, implemented, and completed within 24 months after permit issuance.

<u>Reporting</u>. BRE will submit to USFWS by April 30 of each year an annual report detailing expenditures made during the preceding calendar year and the current balance of the funds. The conservation fund administrator and BRE will each certify the accuracy of information contained in this report. These reports are intended to help USFWS ensure that adequate funding will be provided to implement the HCP and that funding sources at the required annual levels are reliable and will meet the purposes of the HCP.

<u>Basis for Bat Conservation Fund Amount</u>. BRE estimates that up to 70.0 Indiana bats and 14.0 Virginia big-eared bats may be taken during the 25-year permit term. Mist netting and other surveys have not identified any priority bat habitats on covered lands (e.g., winter hibernation or summer maternity colonies), and disturbed habitat is common within the region (see Section 3.1). Therefore, permanent habitat disturbance associated with Project construction is not expected to measurably increase the Project’s estimated level of take of Indiana bats or Virginia big-eared bats. In addition, BRE expects that any take caused by Project operations will affect males and non-reproductive females. Consequently, by focusing on conservation projects that protect or enhance priority habitat for reproductive females, the proposed conservation fund will sufficiently mitigate the Project’s unavoidable impacts.

To identify potential conservation projects, BRE consulted with USFWS and WVDNR and identified maternity areas and hibernacula on private lands ranging in size between 60 and 450 acres. These key areas currently produce between 12 and 12,000 Indiana bats annually. Information concerning these key conservation areas resides at USFWS; however, due to the need to protect the location of these areas from disturbance, these locations are withheld from disclosure in this HCP.

Using the acreages associated with these specific conservation areas, BRE estimates that it can protect a key maternity area or hibernacula on private land within the Appalachian Mountain Recovery Unit by acquiring approximately 200 to 300 acres at a cost of about $2,000 per acre or less. BRE estimates that the transaction costs associated with such an acquisition will be approximately $70,500, including a property survey, recording, Phase I environmental assessment, and title insurance. BRE will seek to transfer ownership and management responsibility for the off-site conservation property to a government entity such as US Forest

Service, WVDNR, or a qualified conservation organization. Based on discussions with conservation organizations active in West Virginia, BRE estimates that, in the event that it ends up maintaining ownership of the off-site conservation property, the annual management costs for the off-site conservation property should be approximately 15% of the acquisition costs, or $90,000 over the life of the ITP.

BRE agrees that the annual management costs will cover property management tasks, preserving general habitat functions for the species, ensuring the species unimpeded ingress and egress to an from hibernacula, maintenance and installation of cave gates to prevent human access (in the event the project is cave protection), timber management for roost trees (in the event the project is maternity habitat protection), and monitoring for species benefits.

Based on these estimates, BRE concludes that ,at a cost of $785,500 or less including transaction costs and a management fund, it could acquire or otherwise protect about 300 acres suitable habitat that would result in the production of more than 70.0 Indiana bats and other bats species per year, using current cave counts and other estimates. This amount of habitat would also be sufficient to protect an assemblage of maternity trees plus a buffer or a cave entrance or entrances plus a buffer. In addition, BRE will provide $25,000 to fund additional Virginia big-eared bat habitat restoration projects, in the event the selected conservation project does not also benefit Virginia big-eared bat.

Table 6.1 Funding Assurances Budgets.

Task	Estimated Cost: Per year	Estimated Cost: Total	Major Assumptions/Cost Basis
Intensive monitoring Years 1-3	$422,000[1,2]	$1,266,000	30 40-m plots, daily searches, may be required Year 4 if take exceeds limit
Monitoring for maternity colonies	$120,000	$120,000	If needed based on changed circumstances; approximate cost based on effort needed to capture an Indiana bat
O&M monitoring - annual for ITP duration	$70,000[1,2]	$1,750,000	24 40-m plots, weekly searches, approximately 24 hours per week, 7.5 months per year; performed by O&M personnel
Annual meetings	$6,000	$150,000	Conducted by consultant Years 1-3, conducted by BRE all other years
Annual reports[1, 3]	Included above		Prepared by consultant Years 1-3, prepared by BRE all other years
Mowing Years 1-3	$28,800	$86,400	48 plots, $50/plot, bi-monthly April – September (12 times/year)
Mowing Years 4+	$14,400	$244,800	24 plots, $50/plot, bi-monthly April – September (Mow 12 times/year)
Annual O&M training[3]	Included above		
Land Acquisition Costs for Off-site Habitat Conservation[4]		$600,000	300 acres, $2,000/acre.
Virginia big-eared bat cave gating		$25,000	2 gates, averaging $12,500/gate
Land Transaction costs		$70,500	Property survey, Phase 1 Environmental Assessment, title insurance, recording
Long term management costs		$90,000	Up-front contribution of up to 15% of acquisition costs

[1] Searcher efficiency and carcass removal trial costs included in intensive monitoring costs.
[2] Years 1-3, reporting costs included in intensive and annual monitoring costs
[3] Search and data entry training for O&M personnel included in intensive monitoring costs (BRE and consultant searchers trained concurrently)
[4] One-time payment to be made within 90 days of the receipt of the ITP

7.0 ALTERNATIVES CONSIDERED

The ESA implementing regulations require a description of "alternative actions to such taking." Four alternatives are considered in this HCP: 1) alternative project locations, 2) an alternative involving reduced conservation measures, 3) alternative energy sources for electricity generation, and 4) a no action alternative under which no ITP would be issued and the existing 67-turbine project would operate under the current operating regime.

7.1 Alternative Project Locations

Under this alternative, the Project would be sited at a different location to minimize potential for take of listed species. During the Project development process, BRE took into consideration environmental concerns including listed species. BRE conducted due diligence studies and determined that the site as chosen would have minimal potential for impacting listed species, including Indiana bat and Virginia big-eared bat (BHE 2006a). The site location, habitat, and physiographic characteristics likely provide foraging habitat, but there were no hibernacula on or near the site and the potential for maternity colonies is low due to the site's elevation. In addition, land uses at the site and surrounding areas are industrial in nature and include historic and current mining, oil and gas exploration, and timber harvest industries—i.e., BRE selected a site that is historically managed for industrial purposes.

Alternative sites for the Project in the region are unlikely to reduce the potential for impacts to listed species more than the current site. While this portion of West Virginia is within the range of Indiana bat (see USFWS 2007), moving to a location outside Indiana bat range would be infeasible for meeting the market demands for clean renewable power served by the current Project location. Alternative high-elevation ridgeline sites within the nearby region would likely have similar potential for impacts to Indiana bats as the current site (i.e., low potential for affecting maternity colonies but potential for migrating Indiana bats to move through). Lower elevation sites could be closer to suitable maternity habitat, and other non-industrial sites could have greater habitat impacts. Also, proximity to occupied bat caves for other sites could also pose greater or lesser risks than the current site depending on location and in particular for Virginia big-eared bat if the alternate site was closer to an occupied cave for that species.

7.2 Reduced Conservation Measures

Under this alternative, the Project would operate as proposed without seasonal or daily operational restrictions on the existing 67 wind turbines and the additional 33 constructed turbines. In addition, BRE would forego all other conservation measures not otherwise required by the WVPSC siting certificate, and BRE would forego establishment of a fund to facilitate conservation projects.

Through discussions with the USFWS and WVDNR, BRE determined that implementation of this alternative would likely not be supported by the best available scientific information, nor would it result in implementation of conservation measures that are rationally related to the potential level of take that could occur as a result of Project construction and operation. As discussed above, using conservative modeling assumptions, BRE has determined that the Project may result in the take of up to 5.0 Indiana bats and 1.0 Virginia big-eared bat per year. Consequently, issuance of an ITP permitting the unrestricted operation of the Project without implementation of appropriate conservation measures would not comport with the requirement for BRE to minimize and mitigate the effects of take to the maximum extent practicable.

7.3 Alternative Energy Sources for Electricity Generation

Under this alternative, the Project would be constructed using a different technology to generate electricity. During the Project development process, BRE evaluated the potential for using coal and natural gas technologies to generate electricity in West Virginia. These technologies would have permitted BRE to build the Project at a specific West Virginia location in McDowell County that was farther from known Indiana bat and Virginia big-eared bat habitat, consequently reducing the potential for take. However, using fossil fuels to generate electricity raises a significant number of additional potential environmental impacts, including significant concerns regarding air pollution and greenhouse gas emissions caused by fuel combustion and damage to water quality and wildlife habitat during fuel exploration and production. As noted in an October 2009 National Academy of Sciences report, "the life-cycle damages of wind power are small compared with those from coal and natural gas."[33] Consistent with this conclusion, BRE determined that while using coal or natural gas technology for the Project may have reduced the potential for take of Indiana bats and Virginia big-eared bats, it would have significantly increased the Project's overall negative impacts on the environment.

7.4 No Action Alternative (No ITP)

Under the No Action Alternative, no ITP would be issued by USFWS. Accordingly, the Project would be operated in such a manner that no take will occur, thus precluding the need for an ITP. Under this alternative, BRE would continue to implement the operational and construction restrictions defined in the January 2010 stipulations. BRE would forego the full benefits of Project construction and operation, and BRE would not implement research, mitigation, and adaptive management processes to evaluate, minimize, and mitigate the potential take of Indiana bat and Virginia big-eared bat.

BRE has chosen not to pursue the No Action Alternative because of BRE's desire to maximize energy production using reliable sources of wind energy supply that advances national renewable energy objectives and economic opportunities in the local area while at the same time minimizing impacts to wildlife. The no action alternative would not achieve this balance.

[33] Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use, *National Academies Press*, October 2009 *available at* http://www.nap.edu/catalog.php?record_id=12794.

8.0 PLAN IMPLEMENTATION / CHANGED AND UNFORESEEN CIRCUMSTANCES / ADAPTIVE MANAGEMENT

8.1 Plan Implementation

The HCP is a mandatory element of the permit application and its implementation will be a condition of the permit. The HCP is designed to be self-implementing, providing the requirements for covered activities, as well as required avoidance, minimization and mitigation measures. To reiterate these commitments and to identify any other implementation procedures, BRE will enter into an Implementing Agreement (IA)(Appendix F) with USFWS.

BRE believes it appropriate to consider the exceedence of the aggregated take of 70.0 Indiana bats or 14.0 Virginia big-eared bats over the term of the ITP (5.0 x 3 years + 2.5 x 22 years = 70.0 and 1.0 x 3 years + 0.5 x 22 years = 14.0) to constitute an exceedence in authorized take potentially requiring permit amendment, suspension, or revocation.

Initially, BRE will meet on an annual basis during the month of February with USFWS during Years 1-3 of the ITP to discuss monitoring results and to proposed monitoring strategies for the calendar year, adjustments to project operations (if necessary), and progress towards achieving biological goals and objectives. Thereafter, BRE and USFWS will meet on an annual basis as determined by the parties.

The research, intensive monitoring, and annual monitoring outlined in the RMAMP will commence in the 2012 field season (April 1 – November 15), provided that an ITP has been issued. Thereafter, intensive monitoring will continue for two additional years in 2013 and 2014 as described in the RMAMP. BRE will implement the Curtailment Plan upon ITP issuance regardless.

The applicant requests the benefits of the Federal “No Surprises” Rule, 63 Fed. Reg. 8859 (Feb. 23, 1998) (codified at 50 C.F.R. §§ 17.3, 17.22(b)(5), 17.32(b)(5)). It generally provides assurances to Section 10 permit holders that, as long as the permittee is properly implementing the HCP, the IA, and the ITP, no additional commitment of land, water, or financial compensation will be required with respect to covered species, and no restrictions on the use of land, water, or other natural resources will be imposed beyond those specified in the HCP without the consent of the permittee. The “No Surprises” Rule has two major components: changed circumstances and unforeseen circumstances.

8.2 Changed Circumstances

The term “changed circumstances” means changes in circumstances affecting a species or geographic area covered by an HCP that can reasonably be anticipated and that can be planned for (e.g., the listing of new species or a fire or other natural catastrophic event in areas prone to such events).

As discussed in the HCP Handbook (USFWS and NMFS 1996) with respect to foreseeable changed circumstances, the HCP should discuss measures developed by the applicant to meet such changes over time, possibly by incorporating adaptive management measures for covered species in the HCP. HCP planners should identify potential problems in advance and identify specific strategies or protocols in the HCP for dealing with them, so that adjustments can be made as necessary without having to amend the HCP. BRE has identified impacts to covered species from WNS, exceedences in authorized take of covered species due to expansion or changes in species range, the listing of new species, and changed technologies/techniques as changed circumstances warranting consideration and planning in this HCP.

8.2.1 Impacts of WNS on Covered Species

The occurrence of WNS and declines in the Appalachian Mountain Recovery Unit of Indiana bat or the listed species of Virginia big-eared bat constitute foreseeable changed circumstances that warrant consideration in this HCP. The occurrence of WNS has been confirmed in nearby bat populations; however, it is difficult to predict at this time what the long-term effects of WNS will be on the covered species. The trigger for changed circumstances for WNS will be a specified reduction in Indiana bat or Virginia big-eared bat populations within the Appalachian Mountain Recovery Unit or national population, respectively. The level of reduction will be measured against the population at the time the ITP is issued, as memorialized in USFWS's accompanying Biological Opinion. USFWS is currently developing a demographic model to assist its evaluations. It is premature, however, to assign a percentage reduction to be used as a trigger for changed circumstances.

If this reduction is realized, USFWS will notify BRE of this circumstance, and the parties would meet and confer over potential changes to the HCP to address this changed circumstance. At the time such a changed circumstance occurs, the parties will evaluate monitoring data to assess the amount of actual take based on adjusted fatality estimates of covered species that has occurred and that is likely to occur in the future.[34] Depending on the circumstances at the time, the parties may discuss the need for additional operational restrictions to avoid, minimize, or mitigate potential take.

The causes of WNS are not fully understood at this time; however, some parties have suggested WNS may be caused by climatic conditions or other currently unknown factors outside the control of BRE (USFWS 2010b). The Project is not contributing to the cause of climate change, and the Project by nature is designed to address climate change through production of non-polluting electrical energy for consumer use. In the event that climate change is the causal reason for conditions such as WNS and therefore population declines in bat species, the Project is contributing to measures to curtail the production of greenhouse gases a cause of the current climate change trends.

Additional conservation strategies that could be implemented include bat deterrent technology, additional turbine operation measures, or prioritizing conservation funding to projects designed to address population change in bats. Due to the uncertainties around impacts and solutions to

[34] Intensive monitoring during Years 1-3 and annual monitoring during all years of the ITP will provide data on all bat fatalities, as well as covered species fatalities that may be used to estimate the level of covered species fatalities should bat populations significantly decline. During Years 4-25, BRE and USFWS will confer to evaluate the utility of all bat monitoring data to determine if take is even likely occurring, and if so, at what levels.

WNS, the outcome and need for additional action on the part of BRE is difficult to predict. If Indiana bat and Virginia big-eared bat take from the project has been negligible or the estimated take as determined by evaluation of impacts to other species is negligible, it is possible that no additional actions will be needed. In the event of catastrophic decline in the Indiana bat and/or Virginia big-eared bat populations, the potential for take of either species at the Project may further decline; however, the impact of even small amounts of take would become more significant to the species as their numbers decline. Under this scenario, BRE will confer with USFWS over potential changes to the HCP that recognize these factors and potential declining risks of take.

8.2.2 Elevated Annual Take Due to Changing Environmental Conditions

A primary biological goal of this HCP is to minimize potential take of Indiana bats from the Project through on-site minimization measures. Available scientific information indicates that potential take of Indiana bats at the Project as a result of turbine operations could range up to 5.0 bats per year during research and development of avoidance/minimization measures and up to 2.5 per year after implementation of avoidance/minimization measures. However, as explained above, no Indiana bats have been captured or observed at the Project, and available scientific information derived from other wind sites and available scientific literature indicate that take of Indiana bats would likely be less than 5.0 per year.

Given uncertainties about the presence of Indiana bats in the Project area, the potential expansion of the species' range, and local population size over time as a result of recovery actions implemented for Indiana bat or possible changes in habitat utilization as a result of climate change, the distribution and occurrence of Indiana bat in or near the project could change (e.g., establishment of a maternity colony near the Project). As a result, BRE believes it appropriate to plan for potential exceedence of take of 5.0 Indiana bats per year during the term of the ITP and will implement the following measure to address this changed circumstance.

In the event take of Indiana bats exceeds 5.0 in any year during Years 4 through 25 of the ITP, or if BRE, in consultation with the USFWS, has reason to believe based on annual monitoring that the aggregate take of covered species may be exceeded, BRE will notify USFWS and confer over potential adjustments to its research study design for subsequent years to focus on those specific areas of the Project or time of year demonstrating the highest likelihood of take based on the new information. Through this process, BRE will intensively evaluate geographic areas of the site containing the species, including seasonal and temporal presence of the species, and it will develop and implement turbine-specific operational protocols to reduce take in these areas to help insure the amount of authorized take is not exceeded.

8.2.3 Listing of New Species

In the event of any future listing of bats or other species as threatened or endangered, BRE will confer with USFWS over the need to pursue an amendment to the HCP and ITP in accordance with Section 8.4 of the HCP. In the event of a future candidate species designation, BRE will similarly confer with USFWS over the need to pursue an amendment of this HCP to include these as covered species and incorporate appropriate conservation measures.

Populations of cave-dwelling bats in the eastern and central U.S. may be declining due to WNS or other factors. In particular, northern myotis (northern long-eared bat) (*Myotis septentrionalis*), eastern small-footed myotis (*Myotis leibii*), and little brown bat (*Myotis lucifugus*) may have experienced declines in recent years due to a variety of factors.

All three of these species may occur in the Project area. If one or more of these species become listed during the permit term, BRE will comply with the ESA and BRE may seek to include such newly listed species as covered species in the ITP prior to, or after, issuance of the final ITP.

8.2.4 Changed Technology/Techniques

Over the 25-year life of the permit, it is reasonably foreseeable that advances in wind turbine technology and techniques to avoid or minimize the mortality of bats will be made. For example, the use of acoustic deterrents is currently being studied for reducing bat mortality at wind turbines (Szewczak and Arnett 2007); however, this technology is currently not available on a large scale for use in wind energy facilities. Over time, other techniques that otherwise deter bats from collisions with turbines may prove effective in reducing bat mortality (e.g., changes in turbine colors, habitat modifications, etc.).

Changes in turbine configuration, technology such as new turbine and/or blade designs, or automated changes in turbine operation triggered by monitoring parameters correlated to high risk to bats (such as weather variables or detection of high bat activity near the turbines) may also prove useful in reducing bat mortality at wind turbines. If new techniques or technology become available that cost less to implement, BRE will evaluate whether to replace the measures detailed in the HCP and then take action if BRE determines that that the new measures are cost-effective, feasible to implement, and meet the biological objectives of the HCP. Although some technologies may be cost-effective, other factors may render them infeasible (e.g., topography, site constraints, safety, legal constraints). Additionally, although some measures may cost less to implement, timing may play a factor in whether such technologies are cost-effective to implement (i.e., it may not be financially prudent to change approaches in the latter years of the permit, especially if recorded take is negligible).

8.2.5 Development of an Indiana Bat Maternity Colony in or Within 2.5 Miles of the Project Area

The project area is located in an area surrounded by a matrix of second and third growth upland forest, with small openings and forest roads. Such areas may provide potential foraging habitat, travel corridors, and maternity roost trees for Indiana bats. Summer mist-netting in habitat close to the Beech Ridge turbine strings in 2005, 2006, and 2010 did not capture Indiana bats, indicating a low likelihood of an Indiana bat maternity area currently located within 2.5 miles (4.1 km) of the turbines, the distance females typically forage from their roosting area. In addition, the elevation and cold nighttime temperatures experienced in the project area may reduce the likelihood that maternity areas occur or will develop in the project area (see Section 3.2.1.9).

A small number of Indiana bat-like calls, made by individuals of unknown sex and age, were recorded on the project site at different locations during the late breeding/early fall migration season in late July 2005 and in late July 2010. These calls could suggest the use of the project area by reproductive female Indiana bats, but such calls could have been made by males that begin migratory movements at this time.

Given the potential availability of suitable summer roosting and foraging habitat surrounding the project site, it can be reasonably anticipated that a maternity colony could develop within the project area over the term of the permit. If such a maternity colony develops, it is possible that the amount of take of Indiana bats contemplated in the permit could increase. Such an increase could result in exceeding the level of authorized take, potentially giving rise to the need to amend the permit.

Given the amount and diversity of habitat surrounding the project, it will be difficult to detect if an Indiana bat maternity colony develops in the project area over the life of the permit that may be affected by project operations. Discovery of a reproductive female or young-of-the-year juvenile Indiana bat fatality during monitoring during the maternity season (May 15 to August 15) (a "Maternity Take Event") could indicate the presence of a maternity colony near covered lands.

If a Maternity Take Event occurs, such an event may constitute a changed circumstance requiring additional surveys and additional minimization measures. Upon such an occurrence BRE will immediately raise turbine cut-in speeds to 15.2 mph (6.9 m/s) during the maternity season (May 15 to August 15) at all turbines within 5 miles (8 km) of the turbine where the Maternity Take Event occurred from one half hour before sunset to one-quarter hour after sunrise. Thereafter, BRE will develop and implement final operational adjustments during the maternity season in consultation with USFWS known to be effective in avoiding Indiana bat mortality. Available literature and discussions with researchers (Good et al. 2011; personal communications, June 2011, with Chris Hein, Bat Conservation International, and Erin Baerwald, University of Calgary) show that no take of Indiana bats has been observed at turbine cut-in speeds above 11.0 mph (5.0 m/s). Available data indicate that take of *Myotis* may have occurred at turbine cut-in speeds of 14.3 mph (6.5 m/s) (Table 4.5); however, no information exists to indicate such take was of listed Indiana bats. Higher cut-in speeds have not yet been tested, but, given that there has only been one *Myotis* fatality at turbines with cut-in speeds of 14.3 mph (6.5 m/s) and that most high frequency bat calls are recorded below rotor-swept area (see Section 3.3.2 in the ABPP), *Myotis* fatalities are expected to be unlikely at cut-in speeds of 15.2 mph (6.9 m/s) (Table 8.1).

If a Maternity Take Event occurs, BRE will also promptly notify USFWS and implement surveys to determine if a maternity colony is present within 2.5 miles (4.1 km) of the project. Such surveys may include intensive habitat surveys within a 2.5-mile (4.1-km) radius of the turbine where the mortality occurred; conducting additional summer mist net surveys in tandem with acoustic detectors to screen areas for high bat activity; and placing radio-transmitters on captured Indiana bats to locate the roost trees, track movements, and determine foraging areas of individual Indiana bats. Final surveys will be determined by BRE in consultation with USFWS

Table 8.1 *Myotis* Fatalities for Which Turbine Cut-in Speed is Known.

	Turbine Cut-in Speed/*Myotis* Fatalities[1]			
Project	Fully operational (3.5 or 4.0 m/s cut-in speeds)	5.0 m/s	5.5 m/s	6.5 m/s
Fowler Ridge (Indiana bat)[2]	0	1	na	0
Casselman (all little brown bats)[2]	3	0	na	1
Alberta (various species)[2]	8	Na	5	na
Total	11	1	5	1

[1]Table reports *Myotis* fatalities for which the turbine treatment under which the fatality occurred is known; for Fowler Ridge and Casselman all such fatalities were Indiana bat and little brown bat, respectively.
[2] Sources: Fowler Ridge (Good et al. 2011); Casselman (personal communication, June 9, 2011, with Chris Hein, Bat Conservation International); Alberta (personal communication, June 9, 2011, with Erin Baerwald, University of Calgary).
na - cut-in speed was not tested in study
0 - cut-in speed was tested and no *Myotis* fatalities occurred

and may include more than one year of surveys. Costs associated with these surveys are addressed in Table 6.1 (see Section 6.0 above). If a maternity colony is identified, BRE will, as described below, evaluate Indiana bat movement in and around the maternity colony, assess the effects of project operations on the maternity colony, and implement, as appropriate, operational adjustments to avoid risk to the maternity colony. If a maternity colony is not found despite multiple years of intensive habitat searches and mist-netting, USFWS may determine that it is unlikely that a maternity colony is present and that the additional maternity season restrictions on operations can be lifted.

If a maternity colony is discovered within 2.5 miles (4.1 km) of the project, either by BRE or a third-party and thereafter its existence is confirmed by USFWS, then BRE will evaluate Indiana bat movement in and around the maternity colony and assess the effects of project operations on the maternity colony. Potential additional surveys may include, but are not limited to, conducting additional summer mist net surveys in tandem with acoustic detectors to screen areas for high bat activity and placing radio-transmitters on captured Indiana bats to track movements and determine foraging areas of individual Indiana bats. If this evaluation and assessment demonstrate that take of reproductive females or young-of-the year juveniles is reasonably certain to occur but such take has not yet occurred, then BRE will develop and implement operational adjustments at turbines within 5 miles (8 km) of the maternity colony in consultation with USFWS known to be effective in avoiding Indiana bat mortality when reproductive females or young-of-the-year juveniles may be present.

A single Maternity Take Event occurring during the implementation of conservation and mitigation measures pursuant to changed circumstances shall be considered covered take under the ITP so long as BRE remains in compliance with the provisions of the HCP, IA and the ITP. Prior to, and after a single Maternity Take Event, take of male occurring at any time or a female or young-of-the-year occurring outside the maternity season shall remain authorized under the

ITP so long as BRE remains in compliance with the conditions of the HCP, IA, and ITP. USFWS reserves the right under 50 C.F.R. § 17.22(b)(8) to revoke the ITP in the event the permitted activity is found by USFWS to be inconsistent with the criterion set forth in 16 U.S.C. § 1539(a)(2)(B)(iv) and the inconsistency has not been remedied in a timely fashion.

8.3 Unforeseen Circumstances

Unforeseen circumstances are defined as changes in circumstances affecting a species or geographic area covered by a conservation plan that could not reasonably have been anticipated by plan developers and the USFWS at the time of the negotiation and development of the plan and that result in a substantial and adverse change in the status of the covered species (50 C.F.R. § 17.3).

The USFWS bears the burden of demonstrating that unforeseen circumstances exist using the best available scientific and commercial data available while considering certain factors (50 C.F.R. §§ 17.22(b)(5)(iii)(C)). In deciding whether unforeseen circumstances exist, the USFWS will consider, but not be limited to, the following factors (50 C.F.R. §§ 17.22(b)(5)(iii)(C)):

1. The size of the current range of the affected species;
2. The percentage of the range adversely affected by the covered activities;
3. The percentage of the range that has been conserved by the HCP;
4. The ecological significance of that portion of the range affected by the HCP;
5. The level of knowledge about the affected species and the degree of specificity of the conservation program for that species under the HCP; and
6. Whether failure to adopt additional conservation measures would appreciably reduce the likelihood of survival and recovery of the species in the wild.

In negotiating unforeseen circumstances, the USFWS will not require the commitment of additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources beyond the level otherwise agreed upon for the species covered by the HCP without the consent of the permittee (50 C.F.R. §§ 17.22(b)(5)(iii)(A)). If additional conservation and mitigation measures are deemed necessary to respond to unforeseen circumstances, the USFWS may require additional measures of the permittee where the HCP is being properly implemented only if such measures are limited to modifications within conserved habitat areas, if any, or to the HCP's operating conservation program for the affected species, and maintain the original terms of the plan to the maximum extent possible (50 C.F.R. §§ 17.22(b)(5)(iii)(B)). Additional conservation and mitigation measures will not involve the commitment of additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources otherwise available for development or use under the original terms of the conservation plan without the consent of the permittee.

Notwithstanding these assurances, nothing in the No Surprises Rule "will be construed to limit or constrain the USFWS, any federal agency, or a private entity, from taking additional actions, at its own expense, to protect or conserve a species included in a conservation plan" (50 C.F.R. §§ 17.22(b)(6)).

8.4 Amendment Process

The HCP and/or ITP may be modified in accordance with the ESA, the USFWS's implementing regulations, the IA, and this chapter. HCP and permit modifications are not anticipated on a regular basis; however, modifications to the HCP and/or ITP may be requested by either BRE or the USFWS. The USFWS also may amend the ITP at any time for just cause, and upon a written finding of necessity, during the permit term in accordance with 50 C.F.R. § 13.23(b). The categories of modifications are administrative changes, minor amendments, and major amendments.

8.4.1 Administrative Changes

Administrative changes are internal changes or corrections to the HCP that may be made by BRE, at its own initiative, or approved by BRE in response to a written request submitted by the Service. Requests from the USFWS will include an explanation of the reason for the change, as well as any supporting documentation. Administrative changes on BRE's initiative do not require preauthorization or concurrence from the USFWS.

Administrative changes are those that will not (a) result in effects on a HCP species that are new or different than those analyzed in the HCP, EIS, or the USFWS's BO, (b) result in take beyond that authorized by the ITP, (c) negatively alter the effectiveness of the HCP, or (d) have consequences to aspects of the human environment that have not been evaluated. BRE will document each administrative change in writing and provide the USFWS with a summary of all changes, as part of its annual report, along with any replacement pages, maps, and other relevant documents for insertion in the revised document.

Administrative changes include, but are not limited to, the following:

- Corrections of typographical, grammatical, and similar editing errors that do not change intended meanings;
- Corrections of any maps or exhibits to correct minor errors in mapping; and
- Corrections of any maps, tables, or appendices in the HCP to reflect approved amendments, as provided below, to the HCP, IA, or ITP.

8.4.2 Minor Amendments

Minor amendments are changes to the HCP the effects of which on HCP species, the conservation strategy, and BRE's ability to achieve the biological goals and objectives of the HCP are either beneficial or not significantly different than those described in this HCP. Such amendments also will not increase impacts to species, their habitats, and the environment beyond those analyzed in the HCP, EIS, and BO or increase the levels of take beyond that authorized by the ITP. Minor amendments may require an amendment to the ITP or the IA. A proposed minor amendment must be approved in writing by the USFWS and BRE before it may be implemented. A proposed minor amendment will become effective on the date of the joint written approval.

BRE or the USFWS may propose minor amendments by providing written notice to the other party. The party responding to the proposed minor amendment should respond within 30 days of receiving notice of such a proposed modification. Such notice shall satisfy the provisions of 50

C.F.R. § 13.23, as well as include a description of the proposed minor amendment; the reasons for the proposed amendment; an analysis of the environmental effects, if any, from the proposed amendment, including the effects on HCP species and an assessment of the amount of take of the species; an explanation of the reason(s) the effects of the proposed amendment conform to and are not different from those described in this HCP; and any other information required by law. When BRE proposes a minor amendment to the HCP, the USFWS may approve or disapprove such amendment, or recommend that the amendment be processed as a major amendment as provided below. The USFWS will provide BRE with a written explanation for its decision. When the USFWS proposes a minor amendment to the HCP, BRE may agree to adopt such amendment or choose not to adopt the amendment. BRE will provide the USFWS with a written explanation for its decision. The USFWS retains its authority to amend the ITP, however, consistent with 50 C.F.R. § 13.23.

Provided a proposed amendment is consistent in all respects with the criteria in the first paragraph of this section, minor amendments include, but are not limited to, the following:

- Updates to the land cover map or to take species occurrence data;
- Decreasing the scope of the covered lands in the HCP;
- Minor changes to the biological goals or objectives;
- Modification of monitoring protocols for HCP effectiveness not in response to changes in standardized monitoring protocols from the USFWS;
- Modification of existing, or adoption of new, incidental take avoidance measures;
- Modification of existing, or adoption of additional, minimization and mitigation measures that improve the likelihood of achieving HCP species objectives;
- Discontinuance of implementation of conservation measures if they prove ineffective;
- Modification of existing or adoption of new performance indicators or standards if results of monitoring and research, or new information developed by others, indicate that the initial performance indicators or standards are inappropriate measures of success of the applicable conservation measures;
- Modification of existing or the adoption of additional habitat objectives for HCP species, where such changes are consistent with achieving HCP species and habitat goals as well as the overall goals of the HCP;
- Minor changes to survey or monitoring protocols that are not proposed in response to adaptive management and that do not adversely affect the data gathered from those surveys;
- Day-to-day implementation decisions, such as maintenance of erosion and sediment control devices;
- Modifying the design of existing research or implementing new research;
- Conducting monitoring surveys in addition to those required by the HCP and ITP;
- Modifying HCP monitoring protocols to align with any future modifications to the protocols by the USFWS;
- Adopting new monitoring protocols that may be promulgated by the USFWS in the future;
- Updating construction windows for HCP species in the event that standard construction windows established for such species are revised by the USFWS and agreed to by BRE; and
- Minor changes to the reporting protocol.

8.4.3 Major Amendments

A major amendment is any proposed change or modification that does not satisfy the criteria for an administrative change or minor amendment. Major amendments to the HCP and ITP are required if BRE desires, among other things, to modify the projects and activities described in the HCP such that they may affect the impact analysis or conservation strategy of the HCP, affect other environmental resources or other aspects of the human environment in a manner not already analyzed, or result in a change for which public review is required. Major amendments must comply with applicable permitting requirements, including the need to comply with NEPA, the NHPA, and Section 7 of the ESA.

In addition to the provisions of 50 C.F.R. § 13.23(b), which authorize the USFWS to amend an ITP at any time for just cause and upon a finding of necessity during the permit term, the HCP and ITP may be modified by a major amendment upon BRE's submission of a formal permit amendment application and the required application fee to the USFWS, which will be processed in the same manner as the original permit application. Such application generally will require submittal of a revised HCP, a revised IA, and preparation of an environmental review document in accordance with NEPA. The specific document requirements for the application may vary, however, based on the substance of the amendment. For instance, if the amendment involves an action that was not addressed in the original HCP, IA, or NEPA analysis, the documents may need to be revised or new versions prepared addressing the proposed amendment. If circumstances necessitating the amendment were adequately addressed in the original documents, an amendment of the ITP might be all that would be required.

Upon submission of a complete application package, the USFWS will publish a notice of the receipt of the application in the Federal Register, initiating the NEPA and HCP public comment process. After the close of the public comment period, the USFWS may approve or deny the proposed amendment application. BRE may, in its sole discretion, reject any major amendment proposed by the USFWS.

Changes that would require a major amendment to the HCP and/or ITP include, but are not limited to:

- Revisions to the covered lands or activities that do not qualify as a minor amendment;
- Increases in the amount of take allowed for covered activities;
- A renewal or extension of the permit term beyond 25 years, where the criteria for a major amendment are otherwise met, and where such request for renewal is in accordance with 50 C.F.R. § 13.22.

8.4.4 Treatment of Changes Resulting from Adaptive Management or Changed Circumstances

Unless explicitly provided in Section 8.2 or the RMAMP of this HCP, the need for and type of modification or amendment (i.e., minor modification, minor amendment or major amendment) to deal with Adaptive Management or Changed Circumstances, including, but not limited to, the addition of new species as covered species, will be determined by the USFWS, in coordination with BRE, at the time such responses are triggered.

8.5 Adaptive Management

The primary reason for using adaptive management in HCPs is to allow for changes in the mitigation strategies that may be necessary to reach the long-term goals (or biological objectives) of the HCP and to ensure authorized take is not exceeded. BRE has provided for the use of adaptive management as described in the RMAMP (Appendix C).

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10.2 Personal Communications

Individual	Affiliation	Dates
Ed Arnett	Bat Conservation International	2010, 2011
Calvin Butchkoski	Pennsylvania Game Commission	2010
Barb Douglas	U.S. Fish and Wildlife Service	2010, 2011
Laura Hill	U.S. Fish and Wildlife Service	2010, 2011
Doug Johnson	U.S. Geological Survey	2010
Allen Kurta	Eastern Michigan University	2010, 2011
Craig Stihler	WV Department of Natural Resources	2010, 2011
John Whitaker	University of Indiana	2010

APPENDIX A

COVERED LANDS LEGAL DESCRIPTION

LEASE AREAS

PART I

A PROPOSED LEASE LOCATED ON BEECH RIDGE APPROXIMATELY 1.6 MILES SOUTHEAST OF THE NICHOLAS AND GREENBRIER COUNTY LINE, PRIMARILY ON THE WATERS OF LAUREL CREEK OF CHERRY RIVER AND BIG CLEAR CREEK AND LITTLE CLEAR CREEK OF MEADOW RIVER, IN WILLIAMSBURG, MEADOW BLUFF, AND FALLING SPRINGS DISTRICTS OF GREENBRIER COUNTY, WEST VIRGINIA, AND BEING MORE PARTICULARLY BOUNDED AND DESCRIBED AS FOLLOWS;

BEGINNING AT A SET STONE FOUND APPROXIMATELY 640 FEET NORTH OF WEST VIRGINIA SECONDARY ROUTE 1/1, AT THE NORTHERNMOST CORNER OF KATHLEEN GWINN'S 19.65 ACRE TRACT AND CORNER TO MEADWESTVACO, THENCE LEAVING SAID GWINN AND THROUGH MEADWESTVACO FOR TWO LINES N 54º25'20" E 8118.51' TO A 1" X 30" IRON REBAR WITH A 21/2" ALUMINUM CAP SET ("LEASE CORNER" HEREAFTER), THENCE S 88 º29'10" E 22066.56' TO A POINT IN A LINE OF PLUM CREEK TIMBERLANDS LIMITED PARTNERSHIP, FROM WHICH A STONE PILE PAINTED RED WITH POINTERS FOUND, CORNER TO SAID PLUM CREEK, BEARS N 09 º32'30" W AT 5245.76 FEET, THENCE WITH SAID PLUM CREEK TIMBERLANDS FOR 104 LINES S 09 º32'30" E 2765.43' TO A STONE PILE PAINTED RED WITH POINTERS FOUND, THENCE N 89 º34'40" E AT 3984.20 FEET PASSING 4.5 FEET SOUTH OF A 4" SUGAR MAPLE WITH RED PAINT AND A MEADWESTVACO BOUNDARY SIGN, IN ALL, 4035.50' TO A POINT IN THE APPARENT CENTERLINE OF WEST VIRGINIA SECONDARY ROUTE 10/1 AT THE POINT OF CURVATURE OF A CURVE CONCAVE TO THE WEST, HAVING A RADIUS OF 900.00', A CHORD BEARING OF S 09 º16'10" E, AND A CHORD LENGTH OF 110.61', THENCE ALONG SAID CURVE AND WITH SAID ROUTE FOR 86 LINES AND WITH SAID MEADWESTVACO FOR 92 LINES AND WITH SAID PLUM CREEK FOR 104 LINES 110.68' TO A POINT, THENCE S 05 º44'40" E 285.57' TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE EAST, HAVING A RADIUS OF 500.00', A CHORD BEARING OF S 10 º14'0" E, AND A CHORD LENGTH OF 78.25', THENCE ALONG SAID CURVE 78.33' TO A POINT, THENCE S 14 º43'20" E 253.74' TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE NORTHEAST, HAVING A RADIUS OF 275.00', A CHORD BEARING OF S 32 º13'00" E, AND A CHORD LENGTH OF 165.34', THENCE ALONG SAID CURVE 167.94' TO A POINT, THENCE S 49 º42'40" E 44.66' TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 400.00', A CHORD BEARING OF S 44 º00'10" E, AND A CHORD LENGTH OF 79.54', THENCE ALONG SAID CURVE 79.67' TO A POINT, THENCE S 38 º17'50" E 121.73' TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE WEST HAVING A RADIUS OF 177.00', A CHORD BEARING OF S 10 º10'30" E, AND A CHORD LENGTH OF 166.86', THENCE ALONG SAID CURVE 173.76' TO A POINT, THENCE S 17 º56'50" W 43.01' TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE NORTHWEST, HAVING A RADIUS OF 115.00', A CHORD BEARING OF S 48 º15'30" W, AND A CHORD LENGTH OF 116.08', THENCE ALONG SAID CURVE 121.67' TO A POINT, THENCE S 78 º34'00" W 559.26' TO A POINT OF CURVATURE OF A CURVE

CONCAVE TO THE NORTH, HAVING A RADIUS OF 400.00’, A CHORD BEARING OF S 73 º53’50” W, AND A CHORD LENGTH OF 65.13’, THENCE ALONG SAID CURVE 65.21’ TO A POINT, THENCE S 69 º13’40” W 150.82’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE SOUTHEAST, HAVING A RADIUS OF 340.00’, A CHORD BEARING OF S 47 º10’10” W, AND A CHORD LENGTH OF 255.36’ THENCE ALONG SAID CURVE 261.78’ TO A POINT, THENCE S 25 º06’50” W 16.76’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE EAST, HAVING A RADIUS OF 145.00’, A CHORD BEARING OF S 09 º21’10” E, AND A CHORD LENGTH OF 164.12’, THENCE ALONG SAID CURVE 174.45’ TO A POINT, THENCE S 43 º49’10” E 43.82’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE NORTHEAST, HAVING A RADIUS OF 450.00’, A CHORD BEARING OF S 53 º28’00” E, AND A CHORD LENGTH OF 150.82’, THENCE ALONG SAID CURVE 151.53’ TO A POINT, THENCE S 63 º06’50” E 126.24’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 275.00’, A CHORD BEARING OF S 53 º11’10” E, AND A CHORD LENGTH OF 94.82’, THENCE ALONG SAID CURVE 95.30’ TO A POINT, THENCE S 43 º15’30” E 62.08’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE NORTHEAST, HAVING A RADIUS OF 800.00’, A CHORD BEARING OF S 46 º08’10” E, AND A CHORD LENGTH OF 80.36’, THENCE ALONG SAID CURVE 80.39’ TO A POINT, THENCE S 49 º01’00” E 66.38’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 600.00’, A CHORD BEARING OF S 45 º22’50” E, AND A CHORD LENGTH OF 76.11’, THENCE ALONG SAID CURVE 76.17’ TO A POINT, THENCE S 41 º44’30” E 106.95’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE NORTHEAST, HAVING A RADIUS OF 675.00’, A CHORD BEARING OF S 56 º39’20” E, AND A CHORD LENGTH OF 347.41’, THENCE ALONG SAID CURVE 351.36’ TO A POINT, THENCE S 71 º34’00” E 87.14’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 75.00’, A CHORD BEARING OF S 52 º53’10” E, AND A CHORD LENGTH OF 48.05’, THENCE ALONG SAID CURVE 48.91’ TO A POINT, THENCE S 34 º12’10” E 65.35’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 500.00’, A CHORD BEARING OF S 30 º41’20” E, AND A CHORD LENGTH OF 61.30’, THENCE ALONG SAID CURVE 61.34’ TO A POINT, THENCE S 27 º10’30” E 20.39’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE NORTHEAST, HAVING A RADIUS OF 275.00’, A CHORD BEARING OF S 32 º10’10” E, AND A CHORD LENGTH OF 47.87’, THENCE ALONG SAID CURVE 47.93’ TO A POINT, THENCE S 37 º09’40” E 146.51’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 950.00’, A CHORD BEARING OF S 34 º03’50” E, AND A CHORD LENGTH OF 120.70’, THENCE ALONG SAID CURVE 102.75’ TO A POINT, THENCE S 30 º57’50” E 62.54’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 450.00’, A CHORD BEARING OF S 24 º55’30” E, AND A CHORD LENGTH OF 94.69’, THENCE ALONG SAID CURVE 94.86’ TO A POINT, THENCE S 18 º53’10” E 15.85’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE NORTHEAST, HAVING A RADIUS OF 100.00’, A CHORD BEARING OF S 33 º07’00” E, AND A CHORD LENGTH OF 49.16’, THENCE ALONG SAID CURVE 49.67’ TO A POINT, THENCE S 47 º20’50” E 23.17’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE NORTHEAST, HAVING A RADIUS OF 460.00’, A CHORD BEARING OF S 53 º14’50” E, AND A CHORD LENGTH OF 94.57’, THENCE ALONG SAID CURVE 94.74’ TO

A POINT, THENCE S 59 º08’50” E 117.36’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 1600.00’, A CHORD BEARING OF S 54 º02’30” E, AND A CHORD LENGTH OF 284.77’, THENCE ALONG SAID CURVE 285.14’ TO A POINT, THENCE S 48 º56’10” E 197.55’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 350.00’, A CHORD BEARING OF S 37 º06’40” E, AND A CHORD LENGTH OF 143.42’, THENCE ALONG SAID CURVE 144.45’ TO A POINT, THENCE S 25 º17’20” E 95.54’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE NORTHEAST, HAVING A RADIUS OF 350.00’, A CHORD BEARING OF S 38 º02’50” E, AND A CHORD LENGTH OF 154.59’, THENCE ALONG SAID CURVE 155.87’ TO A POINT, THENCE S 50 º48’20” E 106.25’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 975.00’, A CHORD BEARING OF S 47 º36’00” E, AND A CHORD LENGTH OF 109.00’, THENCE ALONG SAID CURVE 109.06’ TO A POINT, THENCE S 44 º23’50” E 17.62’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE NORTHEAST, HAVING A RADIUS OF 1000.00’, A CHORD BEARING OF S 50 º46’20” E, AND A CHORD LENGTH OF 222.09’, THENCE ALONG SAID CURVE 222.55’ TO A POINT, THENCE S 57 º08’50” E 383.44’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 2600.00’, A CHORD BEARING OF S 52 º32’20” E, AND A CHORD LENGTH OF 417.70’, THENCE ALONG SAID CURVE 418.15’ TO A POINT, THENCE S 47 º56’00” E 9.97’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE NORTHEAST, HAVING A RADIUS OF 800.00’, A CHORD BEARING OF S 55 º44’50” E, AND A CHORD LENGTH OF 217.55’, THENCE ALONG SAID CURVE 218.22’ TO A POINT, THENCE S 63 º33’40” E 117.24’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 1550.00’, A CHORD BEARING OF S 55 º52’50” E, A CHORD LENGTH OF 414.34’, THENCE ALONG SAID CURVE 415.59’ TO A POINT, THENCE S 48 º12’00” E 129.66’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE NORTHEAST HAVING A RADIUS OF 350.00’, A CHORD BEARING OF S 55 º05’10” E, AND A CHORD LENGTH OF 83.94’, THENCE ALONG SAID CURVE 84.15’ TO A POINT, THENCE S 61 º58’30” E 135.99’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 300.00’, A CHORD BEARING OF S 53 º54’20” E, AND A CHORD LENGTH OF 84.21’; THENCE ALONG SAID CURVE 84.49’ TO A POINT, THENCE S 45 º50’20” E 154.81’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE SOUTHWEST HAVING A RADIUS OF 750.00’, A CHORD BEARING OF S 41 º16’30” E, HAVING A CHORD LENGTH OF 119.36’, THENCE ALONG SAID CURVE 119.49’ TO A POINT, THENCE S 36 º42’40” E 126.65’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 1025.00’, A CHORD BEARING OF S 29 º07’00” E, AND A CHORD LENGTH OF 270.87’, THENCE ALONG SAID CURVE 271.66’ TO A POINT, THENCE S 21 º31’30” E 166.24’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE NORTHEAST HAVING A RADIUS OF 350.00’, A CHORD BEARING OF S 45 º23’00” E, AND A CHORD LENGTH OF 283.13’, THENCE ALONG SAID CURVE 291.48’ TO A POINT, THENCE S 69 º14’30” E 234.05’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 550.00’, A CHORD BEARING OF S 51 º52’30” E, AND A CHORD LENGTH OF 328.34’, THENCE ALONG SAID CURVE 333.42’ TO A POINT, THENCE S 34 º30’30” E 100.09’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE WEST,

HAVING A RADIUS OF 250.00’, A CHORD BEARING OF S 10 º20’30” E, AND A CHORD LENGTH OF 204.68’, THENCE ALONG SAID CURVE 210.87’ TO A POINT, THENCE S 13 º49’20” W 36.12’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE EAST HAVING A RADIUS OF 250.00’, A CHORD BEARING OF S 03 º19’50” W, AND A CHORD LENGTH OF 91.05’, THENCE ALONG SAID CURVE 91.56’ TO A POINT, THENCE S 07 º09’40” E 214.70’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE WEST, HAVING A RADIUS OF 1250.00’, A CHORD BEARING OF S 02 º45’00” E, AND A CHORD LENGTH OF 192.36’, THENCE ALONG SAID CURVE 192.55’ TO A POINT, THENCE S 01 º39’50” W 12.48’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE EAST HAVING A RADIUS OF 325.00’, A CHORD BEARING OF S 11 º37’50” E, AND A CHORD LENGTH OF 149.47’, THENCE ALONG SAID CURVE 150.82’ TO A POINT, THENCE S 24 º55’30” E 232.33’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE WEST, HAVING A RADIUS OF 360.00’, A CHORD BEARING OF S 14 º08’50” E, AND A CHORD LENGTH OF 134.63’, THENCE ALONG SAID CURVE 135.42’ TO A POINT, THENCE S 03 º22’20” E 105.08’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE EAST HAVING A RADIUS OF 900.00’, A CHORD BEARING OF S 15 º16’30” E, AND A CHORD LENGTH OF 371.26’, THENCE ALONG SAID CURVE 373.94’ TO A POINT, THENCE S 27 º10’40” E 110.25’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE WEST, HAVING A RADIUS OF 1250.00’, A CHORD BEARING OF S 16 º01’10” E, AND A CHORD LENGTH OF 483.74’, THENCE ALONG SAID CURVE 486.81’ TO A POINT, FROM WHICH GPS CONTROL POINT #131 BEARS S 87 º34’00” AT 34.10 FEET, THENCE S 04 º51’50” E 110.44’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE EAST HAVING A RADIUS OF 375.00’, A CHORD BEARING OF S 12 º20’40” E, AND A CHORD LENGTH OF 97.66’, THENCE ALONG SAID CURVE 97.94’ TO A POINT, THENCE S 19 º49’40” E 51.75’ TO A POINT, THENCE LEAVING SAID ROUTE N 84 º10’30” E AT 51.30’ PASSING A CONCRETE MONUMENT FOUND, IN ALL 291.07’ TO A 2” IRON PIPE FOUND, THENCE S 56 º38’10” E 198.66’ TO A POINT, THENCE S 62 º15’00” E 259.01’ TO A CHESTNUT STUMP FOUND, THENCE S 47 º34’40” E 1312.37’ TO A STONE PILE WITH POINTER FOUND, THENCE N 86 º12’50” E 1909.07’ TO A 24” BEECH WITH 3 HACKS AND RED PAINT ON TWO SIDES FOUND, THENCE WITH SAID MEADWESTVACO N 89 º30’40” E 716.96 FEET TO A CAR AXLE WITH DOUBLE PINE POINTERS FOUND, IN A LINE OF PLUM CREEK TIMBERLANDS 22,304 ACRE TRACT AND CORNER TO RICHARD AND LINDA THOMAS’ 90.45 ACRE TRACT, THENCE LEAVING SAID PLUM CREEK AND WITH THE SAID 90.45 ACRE TRACT FOR 13 LINES S 08 º43’50” W 1283.70’ TO A 5/8” ROOFBOLT FOUND ON A LARGE ROCK BESIDE A PINE STUMP, THENCE S 61 º09’30” E 111.94’ TO A SET STONE WITH RED AND BLUE PAINT FOUND, THENCE N 80 º31’50” E 137.55’ TO A POINT, FROM WHICH A 12” SUGAR MAPLE WITH THREE HACK MARKS AND RED PAINT FOUND BEARS S 27 º35’ E AT 5.8 FEET, AND A 10” WATER BIRCH WITH THREE HACK MARKS AND RED PAINT FOUND BEARS N 05 º33’ W AT 20.1 FEET, THENCE S 67 º28’10” E 481.42’ TO A STONE PILE WITH BLUE AND RED PAINT FOUND, THENCE S 45 º55’40” E 122.65’ TO A SET STONE FOUND WITH A 5/8” IRON REBAR BESIDE IT, THENCE S 76 º31’00” E 407.87’ TO A SET STONE WITH A 5/8” IRON REBAR BESIDE IT, THENCE N 16 º07’30” E 251.64’ TO A SET STONE WITH POINTERS FOUND AT THE EDGE OF A TIMBERED AREA, THENCE S 65 º47’30” E 1144.08’ TO A 13” X 6” X 10” SET STONE FOUND WITH

A CAR AXLE DRIVEN BESIDE IT, THENCE N 18 º05’40” E 200.29’ TO A SET STONE WITH POINTERS FOUND, THENCE N 05 º58’50” E 543.29’ TO AN 18” X 6” X 3” SET STONE WITH BLUE PAINT FOUND, THENCE N 42 º48’10” E 391.70’ TO A 12” X 6” X 2” SET STONE IN A LARGE OAK STUMP FOUND WITH A CAR AXLE DRIVEN BESIDE IT, THENCE N 53 º08’30” E 572.69’ TO A 12” X 6” X 6” SET STONE WITH RED AND YELLOW PAINT FOUND, THENCE N 20 º15’50” W 869.79’ TO A STONE PILE WITH PINE POINTERS FOUND, CORNER TO SAID PLUM CREEK, THENCE WITH SAID PLUMC REEK FOR 6 LINES

N 77 º54’20” E 2781.83’ TO A STONE PILE FOUND, FROM THE GPS CONTROL POINT #120 BEARS S 23 º08’00” E AT 1063.45’, THENCE N 01 º40’10” W 2289.65’ TO A STONE PILE FOUND, THENCE N 89 º21’40” E 1052.86’ TO A 36” BEECH WITH 3 HACKS FOUND, THENCE N 32 º41’30” E 3598.09’ TO A STONE PILE FOUND, THENCE N 01 º36’40” W 5289.78’ TO A STONE PILE FOUND, THENCE N 42 º47’30” E 910.47’ TO A POINT, FORM WHICH A CONCRETE MONUMENT FOUND A CORNER TO SAID MEADWESTVACO AND SAID PLUM CREEK BEARS N 42 º47’30” E 2598.98’ AND A LEASE CORNER (LEASE AREA NO. 2) BEARS N 59 º36’50” W AT 22.56’, THENCE LEAVING SAID PLUM CREEK AND THOUGH SAID MEADWESTVACO FOR 3 LINES
S 59 º36’50” E 1717.88’ TO A LEASE CORNER FROM WHICH GPS CONTROL POINT #118 BEARS N 08 º03’30” W AT 633.95’ AND GPS CONTROL POINT #117 BEARS S 80 º27’40” E 609.69’, THENCE S 03 º28’10” W 12344.58’ TO A LEASE CORNER, THENCE S 22 º53’20” W 5554.72 TO A 24” X 5” X 15” SET STONE WITH RED PAINT FOUND, A CORNER TO THE FLIPPIN LUMBER COMPANY’S 29.707 ACRE TRACT, FLIPPIN LUMBER COMPANY’S 150 ACRE TRACT, AND ROSS W. STANLEY’S 65.45 ACRE TRACT, THENCE WITH SAID 150 ACRE TRACT FOR 3 LINES AND SAID MEADWESTVACO FOR 6 LINES.

N 08 º01’30” E 1570.62’ TO A 12” X 6” X 15” SET STONE, THENCE N 03 º12’20” W 426.43’ TO A 8” X 36” X 18” SET STONE, THENCE N 22 º44’20” E 227.37’ TO A 12” X 2” X 15” SET STONE, THENCE LEAVING SAID 150 ACRE TRACT AND WITH FLIPPIN LUMBER COMPANY’S 145 ACRE TRACT FOR 3 LINES N 15 º41’00” E 168.44’ TO A 36” X 3” X 12” SET STONE, THENCE N 00 º31’30” E 704.09’ TO A 15” X 5” X 18” SET STONE, THENCE N 14 º22’20” E 229.45’ TO A 5” X 5” X 6” SET STONE, THENCE LEAVING SAID 145 ACRE TRACT AND THROUGH SAID MEADWESTVACO FOR 8 LINES N 67 º40’40” W 3361.65’ TO A LEASE CORNER, FROM WHICH A GPS CONTROL POINT #119 BEARS N 63 º44’10” E AT 2071.72’ AND GPS CONTROL POINT #120 BEARS N 37 º55’50” E AT 1889.13’, THENCE S 40 º08’20” W 35023.61’ TO A LEASE CORNER, THENCE N 59 º30’30” W 4851.72’ TO A LEASE CORNER, FROM WHICH A GPS CONTROL POINT #123 BEARS N 24 º52’30” E AT 1343.77’, THENCE N 13 º27’00” W 10536.46’ TO A LEASE CORNER, THENCE N 68 º13’30” W 14012.46’ TO A LEASE CORNER, FROM WHICH A GPS CONTROL POINT #121 BEARS S 76 º10’30” W AT 1842.19’, THENCE N 36 º12’00” W 17226.70’ TO A LEASE CORNER, FROM WHICH A GPS CONTROL POINT #126 BEARS N 72 º43’00” W AT 1310.36’ AND GPS CONTROL POINT #125 BEARS N 41 º04’40” W AT 1250.08’, THENCE N 43 º51’10” E 6613.70’ TO A POINT IN THE CENTERLINE OF WEST VIRGINIA SECONDARY ROUTE 1/1, A CORNER TO KATHLEEN GWINN’S 19.65 ACRE TRACT, THENCE WITH SAID GWINN

FOR A LINE N 48 º38’10” E AT 38.20 FEET PASSING A 14” BEECH STUMP, IN ALL 640.79’ TO THE POINT OF BEGINNING CONTAINING 27,918.55 ACRES.

304.93 ACRE RESERVATION

THERE IS EXCEPTED AND RESERVED FROM THE AFOREDESCRIBED 27, 918.55 ACRE LEASE A CONSOLIDATED BOUNDARY OF 15 CONTIGUOUS INTERIOR TRACTS, SIX OF WHICH ARE CURRENTLY BEING ASSESSED IN WILLIAMSBURG DISTRICT ON TAX MAP 19 AS PARCELS 1, 2.1, 2.2, 2.3, 3 AND 3.1, SITUATED ON THE WATERS OF MCMILLIONS CREEK ALONG THE NORTHERN SIDE OF WEST VIRGINIA SECONDARY ROUTE 1/1, AND 9 OF WHICH ARE CURRENTLY BEING ASSESSED IN MEADOW BLUFF DISTRICT ON MAP 6 AS PARCELS 2, 2.1, 2.2, 2.3, 3, 4, 5, 6 AND 7, ALONG THE SOUTHERN SIDE OF SAID ROUTE 1/1, AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A 48” CHERRY TREE FOUND, CORNER TO MEADWESTVACO AND LOWELL AND RUTH GWINN’S 4.87 ACRE TRACT, THENCE WITH SAID MEADWESTVACO FOR 25 LINES AND WITH SAID 4.87 ACRE TRACT AND PART OF A LINE OF THOMAS AND JEFFREY VANCE’S RESIDUE OF 283 ACRES FOR ITS REMAINDER

S 88 º 46’50” W 1070.88’ TO A POINT, CORNER TO RICHARD WYKLE’S 3.313 ACRE TRACT, THENCE LEAVING SAID VANCE AND WITH SAID WYKLE FOR A LINE S 54 º18’30” W 716.69’ TO A STONE PILE FOUND, THENCE WITH SAID WYKLE, RICKY AND LINDA GOODIN’S 1 ACRE TRACT, ROBIN AND PATSY GOODIN’S RESIDUE OF 8.895 ACRE TRACT, MARIAN J. THOMAS’ 4.45 ACRE TRACT, J. MICHAEL THOMAS JR.’S 2.75 ACRE TRACT, MIKE AND KELLY TYLER’S 2.342 ACRE TRACT, RIMA MAE PROPPS’ 2.24 ACRE TRACT FOR PART OF A LINE AND WITH SAID VANCE FOR IT’S REMAINDER

N 62 º25’30” W AT 910.43’ PASSING AN “X” ON A ROCK BY A 30” RED OAK, CORNER TO SAID ROBIN AND PATSY GOODIN’S RESIDUE OF 8.895 ACRE TRAC TAND SAID MARIAN J. THOMAS’ 4.45 ACRE TRACT, AT 1476.93’ PASSING A 11/2” IRON PIN WITH CENTER PUNCH, FOUND, CORNER TO J. MICHAEL THOMAS, JR.’S 2.75 ACRE TRACT AND ALSO CORNER TO MIKE AND KELLY TYLER’S 2.342 ACRE TRACT IN ALL 2646.50’, TO A POINT FROM WHICH A 16” BEECH SNAG MARKED AS A REFERENCE FOUND BEARS N 82 º26’10” 36.52’ AND A 10” BIRCH MARKED AS A REFERENCE FOUND BEARS S 63 º54’20” 22.76’, CORNER TO LOWELL AND RUTH GWINN’S 62.42 DEED ACRE TRACT, THENCE WITH SAID GWINN TRACT FOR 6 LINES S 23 º49’00” W 428.50’ TO A SET STONE FOUND MARKED WITH AN “X”, THENCE N 67 º41’00” W 747.21’ TO A SET STONE FOUND, THENCE S 71 º47’10” W 845.82’ TO A 12” BEECH WITH 2 SETS OF 3 HACKS FOUND, THENCE N 52 º11’50” W 487.29’ TO A 24” TRIPLE MAPLE SNAG FOUND, THENCE N 27 º42’10” W 814.47’ TO A SET STONE FOUND WITH “X” ON TOP, THENCE N 50 º35’50” E 1557.87’ TO A SET STONE FOUND MARKED WITH “X”, CORNER TO EARTHEL GWINN’S 21.51 DEED ACRE TRACT, THENCE WITH SAID 21.51 ACRE TRACT FOR A LINE N 69 º53’20” E

500.37’, TO A POINT IN THE CENTER OF WEST VIRGINIA SECONDARY ROUTE 1/1, A CORNER TO KATHLEEN GWINN’S 19.65 ACRES, FROM WHICH A SET STONE FOUND BEARS N 69 º53’20” E AT 23.93’, THENCE LEAVING SAID EARTHEL GWINN AND WITH SAID SECONDARY ROUTE FOR 7 LINES AND SAID KATHLEEN GWINN FOR 9 LINES

N 28 º02’10” W 51.00’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE NORTHEAST, HAVING A RADIUS OF 650.00’, A CHORD BEARING OF N 23 º32’10” W, AND A CHORD LENGTH OF 101.96’, THENCE ALONG SAID CURVE 102.06’ TO A POINT, THENCE N 19 º02’20” W 96.30’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE NORTHEAST, HAVING A RADIUS OF 255.00’, A CHORD BEARING OF N 41 º16’00” W, AND A CHORD LENGTH OF 192.94’, THENCE ALONG SAID CURVE 197.86’ TO A POINT, THENCE LEAVING SAID ROUTE N 63 º29’50” W 304.18’ TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE SOUTHWEST HAVING A RADIUS OF 4200.00’, A CHORD BEARING OF N 59 º51’00” W, AND A CHORD LENGTH OF 534.26’, THENCE ALONG SAID CURVE 534.62’ TO A POINT, THENCE N 56 º12’10” W 119.52’ TO A POINT, THENCE LEAVING SAID ROUTE 1/1

N 48 º38’10” E AT 38.20’ PASSING A 14” BEECH STUMP FOUND, IN ALL 640.79’ TO A SET STONE FOUND, THENCE S 52 º50’50” E 1651.56’ TO A SET STONE FOUND, THENCE N 69 º53’20” E 432.34’ TO A SET STONE FOUND, CORNER TO SAID VANCE THENCE WITH SAID VANCE FOR 4 LINES

N 87 º09’00” E 1625.86’ TO A STONE PILE FOUND, THENCE S 30 º07’10” E 628.92’ TO A STONE PILE FOUND, THENCE S 41 º17’30” W 270.38’ TO A STONE PILE FOUND, THENCE S 29 º18’50” E 1350.46’ TO A STONE PILE FOUND, THENCE WITH SAID VANCE FOR A PART OF A LINE AND WITH SAID LOWELL AND RUTH GWINN’S 4.87 ACRE TRACT FOR ITS REMAINDER.

S 59 º34’30” E 1080.26’ TO A STONE PILE FOUND, THENCE WITH SAID 4.87 ACRE TRACT FOR A LINE S 22 º25’40” E 671.84’ TO THE POINT OF BEGINNING, CONTAINING 304.93 ACRES, BEING THE SAME TWO TRACTS OF LAND SAID TO CONTAIN 19.65 ACRES AND 283 ACRES AND 140 POLES AS CONVEYED FROM LOWELL GWINN ET AL TO KATHLEEN GWINN AND CLEAR CREEK COAL COMPANY TO GUS H. GWINN BY DEEDS DATED AUGUST 5, 1992 AND APRIL 10, 1956 AND RECORDED IN DEED BOOK 419, AT PAGE 9 AND DEED BOOK 194, AT PAGE 626.

THE SAID 27,918.55 ACRES, LESS THE AFORESAID EXCEPTION CONTAINING 304.93 ACRES, LEAVES A NET AREA OF 27,631.62 ACRES.

BEING PARTS OF MULTIPLE CONTIGUOUS TRACTS OF LAND AS CONVEYED FROM WESTVACO CORPORATION TO MEADWESTVACO CORPORATION BY DEED DATED DECEMBER 31, 2002 AND RECORDED IN THE OFFICE OF THE CLERK OF GREENBRIER COUNTY, WEST VIRGINIA, IN DEED BOOK 488 AT PAGE 56.

PART II

TOGETHER WITH, A CERTAIN 5.51 ACRES TRACT WHICH IS EXCEPTED AND RESERVED FROM THE AFOREDESCRIBED 304.93 ACRES A TRACT OF LAND CONTAINING 5.51 ACRES RECENTLY CONVEYED FROM EARTHEL GWINN TO MEADWESTVACO CORPORATION BY DEED DATED APRIL 15, 2009, OF RECORD IN DEED BOOK 527, PAGE 222, BEING MORE PARTICULARLY BOUNDED AND DESCRIBED AS FOLLOWS:

A TRACT OF LAND SITUATE ON THE WATERS OF AN UNNAMED TRIBUTARY OF MCMILLION CREEK AND LYING BETWEEN WEST VIRGINIA SECONDARY ROUTE NO. 1/1 AND EUKE ROAD (PRIVATE ROAD), IN WILLIAMSBURG DISTRICT, GREENBRIER COUNTY, WEST VIRGINIA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A SET STONE WITH AN "X" ON ITS TOP, A CORNER TO MEADWESTVACO CORPORATION’S 12,758.3 ACRES, FROM WHICH GPS POINT NO. 109, A 5/8" X 30" REBAR WITH A 2 ½" ALUMINUM ASI GPS CAP SET FLUSH (GPS CONTROL POINT HEREAFTER), BEARS S 67°34'40" E AT 910.58', THENCE WITH ONE LINE OF SAME

N 69°53'10" E 485.22' TO A 1" X 30" REBAR WITH A 2 ½" ALUMINUM CAP (1" REBAR HEREAFTER) SET ON THE WESTERN RIGHT-OF-WAY LIMITS OF WEST VIRGINIA SECONDARY ROUTE NO. 1/1, 15' FROM CENTERLINE, AND IN A LINE OF MEADWESTVACO CORPORATION’S 12,758.3 ACRES, A NEW DIVISION CORNER TO EARTHEL GWINN’S 21.51 ACRES, FROM WHICH A SET STONE FOUND, A CORNER TO EARTHEL GWINN’S 21.51 ACRES, BEARS N 69°53'00" E AT 39.07' AND FROM WHICH ANOTHER SET STONE FOUND IN A LINE OF SAID 21.51 ACRES AND KATHLEEN GWINN’S 19.65 ACRES, A CORNER TO SAID 19.65 ACRES, BEARS N 69°55'20" AT 803.86', THENCE THROUGH SAID 21.51 ACRES FOR ELEVEN (11) NEW DIVISION LINES AND WITH SAID LIMITS FOR ELEVEN (11) LINES

S 28°54'30" E 34.37' TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 495.38', A CHORD LENGTH OF 129.31' AND A CHORD BEARING OF S 19°34'40" E, THENCE

129.68' ALONG SAID CURVE TO A POINT, THENCE

S 12°04'40" E 20.08' TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE WEST, HAVING A RADIUS OF 195.91', A CHORD LENGTH OF 45.66', AND A CHORD BEARING OF S 05°23'10" E, THENCE

45.76' ALONG SAID CURVE TO A POINT, THENCE

S 01°18'20" W 33.83' TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE NORTHEAST, HAVING A RADIUS OF 135.42', A CHORD LENGTH OF 156.19', AND A CHORD BEARING OF S 33°54'50" E, THENCE

166.48' ALONG SAID CURVE TO A POINT, THENCE

S 69°08'00" E 59.69' TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 656.88', A CHORD LENGTH OF 410.87', AND A CHORD BEARING OF S 50°54'30" E, THENCE

417.88' ALONG SAID CURVE TO A POINT, THENCE

S 32°41'00" E 85.59' TO A POINT OF CURVATURE OF A CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 637.89', A CHORD LENGTH OF 316.90', AND A CHORD BEARING OF S 18°18'10" E, THENCE

320.25' ALONG SAID CURVE TO A POINT, THENCE

S 05°42'50" E 70.33' TO A POINT ON THE LINE OF GUS GWINN’S 0.51 ACRES, FROM WHICH GPS CONTROL POINT NO. 110 BEARS N 80°27'20" E AT 501.14', THENCE LEAVING SAID LIMITS AND WITH SAID 0.51 ACRES FOR A LINE

S 51°34'20" W 15.49' TO A POINT IN THE CENTERLINE OF EUKE ROAD, A CORNER TO LOWELL AND RUTH GWINN’S 64.42 ACRES, FROM WHICH A SET STONE FOUND, A CORNER TO SAID 64.42 ACRES, BEARS S 03°45'40" W AT 1,083.95', THENCE LEAVING SAID 0.51 ACRES AND WITH SAID CENTERLINE FOR TWENTY-TWO (22) LINES

N 30°21'10" W 54.16' TO A POINT, THENCE

N 26°55'00" W 73.77' TO A POINT, THENCE

N 28°51'30" W 76.13' TO A POINT, THENCE

N 32°37'00" W 106.14' TO A POINT, THENCE

N 39°31'40" W 53.82' TO A POINT, THENCE

N 38°20'10" W 17.85' TO A POINT, THENCE

N 47°04'10" W 89.05' TO A POINT, THENCE

N 46°58'50" W 72.18' TO A POINT, THENCE

N 48°53'00" W 78.05' TO A POINT, THENCE

N 52°30'00" W 78.84' TO A POINT, THENCE

N 56°10'40" W 81.71' TO A POINT, THENCE

N 54°40'10" W 75.42' TO A POINT, THENCE

N 50°25'50" W 82.62' TO A POINT, THENCE

N 49°51'00" W 76.57' TO A POINT, THENCE

N 51°58'10" W 53.17' TO A POINT, THENCE

N 56°34'20" W 51.49' TO A POINT, THENCE

N 67°07'40" W 80.87' TO A POINT, THENCE

N 71°02'50" W 48.41' TO A POINT, THENCE

N 73°17'50" W 59.14' TO A POINT, THENCE

N 82°56'30" W 88.34' TO A POINT, THENCE

S 89°18'20" W 99.32' TO A POINT, THENCE

S 83°13'20" W 108.24' TO A POINT, FROM WHICH A SET STONE WITH AN "X" ON ITS TOP, A CORNER TO LOWELL AND RUTH GWINN'S 64.42 ACRES AND SAID 12,758.3 ACRES, BEARS S 50°35'50" W AT 1,400.56', THENCE LEAVING SAID CENTERLINE AND WITH SAID 12,758.3 ACRES FOR A LINE

N 50°35'50" E AT 22.00' PASSING A 1" REBAR SET ON THE NORTH SIDE OF SAID EUKE ROAD, IN ALL 157.31' TO THE POINT OF BEGINNING CONTAINING 5.51 ACRES. BEING A PART OF THE SAME TRACT OF LAND DESCRIBED AS CONTAINING 21.51 ACRES CONVEYED BY LOWELL GWINN, ET AL. TO EARTHEL GWINN BY A DEED DATED AUGUST 5, 1992 AND OF RECORD IN THE OFFICE OF THE CLERK OF GREENBRIER COUNTY IN DEED BOOK 414 AT PAGE 625.

PART III

1.44 ACRES (VANCE)

A TRACT OF LAND SITUATE ON THE WATERS OF AN UNNAMED TRIBUTARY OF MCMILLION CREEK IN MEADOW BLUFF AND WILLIAMSBURG DISTRICTS IN GREENBRIER COUNTY, WEST VIRGINIA, AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT IN THE CENTERLINE OF COLE ROAD (ALSO KNOWN AS COLEMAN ROAD), A NEW DIVISION CORNER TO THOMAS AND JEFFREY VANCE

AND GUS AND EVELYN GWINN’S RESIDUE OF 283 ACRES, FROM WHICH A SET STONE FOUND, A CORNER TO KATHLEEN GWINN’S 19.65 ACRES AND EARTHEL GWINN’S 25.51 ACRES, BEARS N 39º22’30” W AT 1164.72’, AND ALSO FROM WHICH GPS CONTROL POINT NO. 109 BEARS N 46 º15’30” W AT 539.07’, THENCE THROUGH SAID RESIDUE OF 283 ACRES FOR THREE NEW DIVISION LINES

S 71 º30’20” E AT 25.06’ PASSING A 1” X 30” REBAR WITH A 2 ½” ALUMINUM CAP (1” REBAR HEREAFTER) SET ON THE SOUTHEASTERN RIGHT-OF-WAY LIMITS OF MEADWESTVACO CORPORATION’S 50’ RIGHT-OF-WAY ALONG SAID COLE ROAD, IN ALL 87.71’ TO A 1” REBAR SET, THENCE

S 80 º12’20” E 198.78’ TO A 1” REBAR SET, FROM WHICH A GPS CONTROL POINT NO. 110 BEARS S 59 º23’40” E AT 141.49’, THENCE

S 09 º47’40” W 207.96’ TO A 1” REBAR SET, FROM WHICH A POWER POLE NO. 384-41/454D5, BEARS S 36 º20’50” W AT 190.84’, AND ALSO FROM WHICH POWER POLE NO. 384-40/454D4, BEARS N 58 º25’40” W AT 102.30’, THENCE THROUGH SAID RESIDUE OF 283 ACRES FOR PART OF A LINE AND THROUGH THOMAS A. AND JEFFREY E. VANCES 0.51 ACRES FOR ITS REMAINDER

N 74 º58’30” W 185.28’ TO A 1” REBAR SET, THENCE THROUGH SAID 0.51 ACRES FOR PART OF A LINE AND THROUGH SAID RESIDUE OF 283 ACRES FOR ITS REMAINDER

S 82 º54’10” W AT 115.90’ PASSING A 1” REBAR SET ON THE SOUTHEASTERN LIMITS OF SAID COLE ROAD, 25’ FROM CENTERLINE, IN ALL 121.93’ TO A POINT AT THE INTERSECTION OF SAID CENTERLINE OF SAID COLE ROAD AND THE EASTERN RIGHT-OF-WAY LIMITS OF WEST VIRGINIA SECONDARY ROUTE NO. 1/1, ALSO KNOWN AS FENWICK ROAD, 15’ FROM CENTERLINE, THENCE WITH SAID CENTERLINE OF SAID ROUTE NO. 1/1, AND SAID RESIDUE OF 283 ACRES FOR A LINE

N 08 º08’20” W 47.66’ TO A POINT IN THE CENTERLINE OF SAID COLE ROAD, THENCE WITH SAID CENTERLINE FOR FIVE LINES AND WITH SAID RESIDUE OF 283 ACRES FOR PART OF A LINE AND WITH EARTHEL GWINN’S 20.68 ACRES FOR ITS REMAINDER

N 15 º57’00” E 56.63’ TO A POINT, THENCE WITH SAID 20.68 ACRES FOR FOUR LINES

N 18 º17’40” E 42.71’ TO A POINT, THENCE

N 19 º20’50” E 41.36’ TO A POINT, THENCE

N 20 º41’00” E 39.63’ TO A POINT, THENCE

N 22 º28'30" E 16.58' TO THE POINT OF BEGINNING CONTAINING 1.44 ACRES AS SURVEYED ON THE GRID NORTH MERIDIAN BY ALLEGHENY SURVEYS, INC. OF BIRCH RIVER, WEST VIRGINIA, AND SHOWN ON A PLAT ENTITLED "PLAT OF LEASE SURVEY FOR INVENERGY, LLC", ATTACHED HERETO, AND, BY REFERENCE, MADE A PART OF THIS DESCRIPTION.

BEING A PART OF TWO TRACTS OF LAND DESCRIBED AS 0.51 ACRES AND THE RESIDUE OF 283 ACRES, CONVEYED BY EVELYN L. GWINN TO THOMAS A. AND JEFFREY E. VANCE BY A DEED DATED JANUARY 28, 2008 AND OF RECORD IN THE OFFICE OF THE CLERK OF GREENBRIER COUNTY IN DEED BOOK 518 AT PAGE 826, AND BY GUS H. GWINN AND EVELYN GWINN TO THOMAS AND JEFFREY VANCE BY A DEED DATED FEBRUARY 14, 2001, AND BY THOMAS AND JEFFREY VANCE TO GUS AND EVELYN GWINN BY A DEED DATED MAY 14, 2001 AND OF RECORD IN THE OFFICE OF THE CLERK OF GREENBRIER COUNTY IN DEED BOOK 466 AT PAGE 885 AND DEED BOOK 479 AT PAGE 64, CONSECUTIVELY.

PART IV

EXPANSION AREA

A TRACT OF LAND SITUATE ON THE WATERS OF HOMINY CREEK AND CLEAR CREEK IN MEADOW BLUFF AND WILLIAMSBURG DISTRICTS, GREENBRIER COUNTY, WEST VIRGINIA, AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON A LINE OF AN EXISTING LEASE AREA CONTAINING 27,918.55 ACRES, AND INTERIOR TO A TRACT OF LAND CONTAINING 742.5 ACRES (TRACT 40) OWNED BY MEADWESTVACO CORP., THENCE WITH SAID EXISTING LEASE FOR TWO LINES

S 43°51'10" W 4560.08' TO A 1" X 30" REBAR WITH A 2½" ALUMINUM CAP SET, A CORNER TO SAID LEASE, THENCE

S 36°12'00" E 2127.69' TO A POINT, THENCE LEAVING SAID LEASE AND THROUGH LANDS OF MEADWESTVACO
S 02°23'00" E 7327.73' TO A POINT, THENCE

S 89°01'00" W 1519.52' TO A POINT, THENCE

S 52°18'00" W 2893.41' TO A POINT, THENCE

S 04°36'00" W 2873.22' TO A POINT, THENCE

S 30°00'00" W 2078.83' TO A POINT, THENCE

S 01°16'00" W 1230.76' TO A POINT, THENCE

N 87°52'00" W 1515.62' TO A POINT, THENCE

S 72°43'00" W 519.43' TO A POINT, THENCE

N 03°07'00" E 1622.88' TO A POINT, THENCE

N 33°24'00" E 2494.68' TO A POINT, THENCE

N 31°44'00" W 1989.50' TO A POINT, THENCE

S 36°22'00" W 4550.42' TO A POINT, THENCE

N 48°01'00" W 2182.23' TO A POINT, THENCE

N 24°11'00" W 1494.36' TO A POINT, THENCE

S 26°55'00" W 3119.00' TO A POINT, THENCE

S 06°58'00" E 3510.68' TO A POINT, THENCE

S 81°30'00" W 1513.03' TO A POINT, THENCE

N 10°10'00" W 3942.44' TO A POINT, THENCE

N 24°30'00" E 2645.76' TO A POINT, THENCE

N 31°12'00" E 4943.19' TO A POINT, THENCE

N 46°39'00" E 4242.82' TO A POINT, THENCE

N 01°06'00" W 3892.47' TO A POINT, THENCE

N 64°06'00" E 10829.20' TO THE POINT OF BEGINNING CONTAINING APPROXIMATELY 3172 ACRES.

APPENDIX B

SPECIES ACCOUNTS FOR LITTLE BROWN BAT, NORTHERN LONG-EARED MYOTIS, AND EASTERN SMALL-FOOTED MYOTIS

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1.0 INTRODUCTION

Populations of cave-dwelling bats in the eastern and central U.S. are currently declining due to White Nose Syndrome (WNS). The U.S. Fish and Wildlife Service (USFWS) has been petitioned to list northern myotis (northern long-eared bat) (*Myotis septentrionalis*) and the eastern small-footed myotis (*Myotis leibii*) as threatened or endangered. Also, a request has been made for the USFWS to conduct a formal status review of little brown bat (*Myotis lucifugus*) populations to determine if emergency listing is warranted.

All three of these species have been documented through mist-netting as occurring in the Beech Ridge Wind Energy Project (Project) area. If one or more of these species become listed prior to issuance of the ITP or during the permit term, Beech Ridge Energy LLC (BRE) will comply with the ESA and may seek to include such newly listed species as covered species in the HCP or through a major amendment of the incidental take permit (ITP). To facilitate a future permit amendment and to ensure that the effects of the covered activities on these species are adequately analyzed and disclosed during development of the Draft and Final Environmental Impact Statement, information on the biology and current status of these species is included in this appendix, as well as in the Draft and Final Environmental Impact Statement.

2.0 SPECIES ACCOUNTS

2.1 Little Brown Bat

The little brown bat (*Myotis lucifugus*) is a common bat species that ranges from Alaska and Canada, south to southern California, northern Arizona, and northern New Mexico (Fenton and Barclay 1980). This species formerly was categorized as a G5 (secure) species because it is widespread in North America (Natureserve 2011) and was not a species of concern for the state of West Virginia. However, in December 2010, a request was made for the USFWS to conduct a formal status review for little brown bat, due primarily to population declines in the species throughout the northeastern U.S. from WNS.

2.1.1 Life History and Characteristics

Little brown bats have a glossy fur that varies from dark brown, golden brown, reddish, and olive brown. They weigh between approximately 0.2 and 0.5 oz (5 and 14 g), and length varies between 2.3 and 3.9 inches (60 and 102 mm). Females tend to be larger than males, especially during the winter (Fenton and Barclay 1980). Little brown bat is considered a migratory species, traveling several hundred miles between summer roosts and their hibernacula (Humphrey and Cope 1976).

During late March or early April, depending on location, female little brown bats congregate and form maternity colonies in particular roosts that are consistently warmer than the ambient temperature. The exact timing of the establishment of the maternity roosts varies and may depend on elevation and latitude, with more northern bats establishing maternity roosts later in the season. Births in any area are staggered, and most occur within a three-week period (Humphrey and Cope 1976), suggesting variation in the timing of fertilization and departure from hibernacula roosts (Fenton and Barclay 1980). Pups are reared in June and July, and approximately 9.5 days after birth, pups are able to thermoregulate and in three weeks able to fly (Havens and Myers 2006).

Little brown bats are primarily nocturnal, with peak activity occurring about two to three hours after dusk and before dawn (Fenton and Barclay 1980). They are known to travel several miles between day roosts and feeding sites (Nowak 1994). They are opportunistic feeders and feed primarily on aquatic insects hunting approximately 6 to 16 ft (2 to 5 m) above vegetation and water features (Fenton and Bell 1979). They catch prey by aerial hawking or by gleaning tactics (Ratcliffe and Dawson 2003).

2.1.2 Habitat Requirements

Little brown bats are mostly found in forested lands near water (Fenton and Barclay 1980). This species is known to roost in a variety of locations including man-made structures, caves, trees, under rocks, and in piles of wood. Roost site determination is dependent on a number of factors including seasonal timing and site location.

In general, roosts can be divided into day, night, and hibernacula (Fenton and Barclay 1980). Day and night roosts are used during the spring, summer, and fall seasons. Ambient temperature, very little light, and shelter are the most important factors influencing day roost site selection (Fenton and Barclay 1980). They also commonly select day roost sites with southwestern exposure, which provides exogenous heat for arousal from daily torpor (Fenton 1970). Adult males and nonparous females often occupy cooler day roosts sites away from nurseries (Fenton and Barclay 1980). Night roosts can be similar to day roosts but are selected for their confined spaces where large concentrations of bats can cluster together to increase the roost temperature (Fenton and Barclay 1980). Hibernacula sites suitable for little brown bats include caves and abandoned mines where there are high levels of humidity and temperatures above freezing (Hitchcock 1949, 1965; Fenton 1970; Humphrey and Cope 1976).

2.1.3 Demographics

The generalist nature of the little brown bat, including food and habitat selection, largely contributes to large populations of the species (Fenton and Barclay 1980). Little brown bats have low reproduction (one young per year) and relatively long life spans. Little brown bats often survive longer than a decade once they reach adulthood and many have been recorded living longer than 20 years (Natureserve 2011). Mortality rate is highest during the first winter when young of the year are smaller than adults (Fenton and Barclay 1980). Average survival rates for males are an estimated 1.55 years and for females are an estimated 1.17 to 2.15 years (Humphrey and Cope 1976).

2.1.4 Range and Distribution

Little brown bats are found throughout much of the United States and Canada. They are absent from the southern Great Plains region of the U.S., southern California, and parts of the Virginia and Carolina coast (Fenton and Barclay 1980). This species is widely distributed throughout West Virginia, inhabiting caves, abandoned mines, rock piles, trees, and buildings.

2.1.5 Dispersal and Migration

Based on categories described by Fleming and Eby (2005), bat species can be divided into three movement categories: (1) sedentary species that breed and hibernate in the same local areas, usually moving less than 30 miles (50 km) between summer and winter roosts; (2) regional migrants that migrate moderate distances between 60 to 310 miles (100 to 500 km); and (3) long-distance migrants that have highly developed migratory behavior, sometimes traveling greater than 620 miles (1,000 km) between summer and winter roosts. Little brown bats are generally considered regional migrants (Natureserve 2011). Studies tracking female little brown bats have shown movement between hibernacula and summer roosts encompassing several hundred miles (Davis and Hitchcock 1965; Griffin 1970; Fenton 1970; Humphrey and Cope 1976). Movement by male little brown bats is less understood due to more isolated roost selection, but they are generally believed not to migrate as far and spend more time closer to the hibernacula. Dispersal appears to vary by regions with northeast population migrating greater distances, while western populations are believed to hibernate closer to summer ranges (Schmidly 1991).

2.1.6 Potential Impacts from Wind Turbines

Little brown bat fatalities have been documented at wind turbines throughout their range, including the Appalachian Mountain region (see Arnett et al. 2008). *Myotis* bats in general have not comprised a large percent of bat fatalities from monitored wind energy facilities, but little brown bat has been the most common *Myotis* fatality (Arnett et al. 2008). For wind projects throughout their range, little brown bat has comprised between 0 and 24% of the bat fatalities found through monitoring studies (Arnett et al. 2008). Within the Appalachian Region, the percent of all bat fatalities that were little brown bat has ranged from 4.7 to 14.7 % (see Table 4.3 of the HCP).

Little brown bat has been documented on the site during summer and fall mist-net surveys (BHE Environmental, Inc. 2005, 2006; Young and Gruver 2011) and was the most common of the *Myotis* species captured during the summer and second most common during the fall (Young and Gruver 2011). Both adult and juvenile individuals were captured during summer surveys, indicating that maternity colonies likely occurred within the nightly foraging range for this species. Information about nightly foraging range is limited, but it is likely they travel several miles between day roosts and feeding sites (Nowak 1994). Potential impacts from the Project will likely include direct fatalities of little brown bat and potentially loss of roost trees during clearing for construction of the 33-turbine phase. The actual presence of maternity roost trees is unknown, but given the results from the site-specific surveys, it is believed possible that maternity roosts for little brown bat may occur on-site.

2.1.7 BRE HCP Benefits

The HCP proposes: (1) on-site measures to minimize impacts to all bats and (2) funding to be administered by National Fish and Wildlife Foundation (NFWF) for off-site conservation measures that would target conservation of Indiana bat maternity or wintering habitat. The proposed on-site minimization measures are intended to reduce all bat mortality by 50% or more and would include raising turbine cut-in speed to a wind speed determined through project research and monitoring studies. Three studies have shown that raising the cut-in speed of turbines reduces all bat mortality (Arnett et al. 2010). Raising the cut-in speed results in less turbine operations during periods of low wind speed (those periods when winds are below the cut-in speed). Available information indicates that a turbine operating less during low wind speeds is less risky to all flying bats and therefore also likely to reduce potential mortality impacts for little brown bat (Arnett et al. 2010). Under the assumption that the estimated reduction in all bats mortality (approximately 50% for a cut-in speed of 11.2 mph [5.0 m/s]) applies to all bat species, it could be expected that the on-site minimization measures would result in 50% fewer little brown bat fatalities. The monitoring plan for the HCP is designed to detect all bat species and will estimate impacts for all bat species. Potential impact to little brown bat from the project will be measured during the on-site monitoring studies.

Providing off-site habitat conservation measures for Indiana bats is likely to also benefit little brown bats due to sympatric occurrence and habitat similarities between these two species (see Section 4.1.3 of the HCP). Indiana bat and little brown bat are often captured at the same locations during mist-netting surveys, and these two species frequently use the same maternity colonies and hibernacula. Off-site habitat conservation measures for the BRE HCP, whether protecting summer or winter habitat, may benefit little brown bat.

2.2 Eastern Small-footed Myotis

The eastern small-footed myotis (*Myotis leibii*) is considered one the least common bat species in North America (Barbour and Davis 1969; Blasko 2001). Less information exists concerning this species compared to other bat species; however, they are known to range from Ontario and New England southward to Georgia and Alabama and westward into Oklahoma (Barbour and Davis 1969). In West Virginia, they are categorized by the state as an S1 species, which are species considered extremely rare and critically imperiled; there are five or fewer documented occurrences or few remaining individuals occurring within the state (West Virginia Department of Natural Resources n.d.; West Virginia Natural Heritage Program 2007); . The USFWS was petitioned to list eastern small-footed myotis as threatened or endangered in August 2010 (Center for Biological Diversity 2010).

2.2.1 Life History and Characteristics

Eastern small-footed myotis is one of the smallest *Myotis* species in North America (McDaniel et al. 1982). Their pelage is generally a dark-yellowish brown with some black undertones. Their average mass is around 0.13 oz (3.8 g) (range 0.11 to 0.20 oz [3.2 to 5.5 g]) (van Zyll de Jong 1985), and average length is around 3.2 inches (83 mm). This species has similar characteristics as other *Myotis* species; however, the eastern small-footed myotis tolerates colder temperatures than the little brown bat (Best and Jennings 1997). Eastern small-footed myotis are among the last *Myotis* species to reach their hibernacula in autumn, often as late as mid-November, and are usually the first to leave in the spring, in March or early April (Barbour and Davis 1969; Fenton 1972). Hibernation generally occurs from October to April where they usually hibernate singly but can be found in small groups or within groups of other species (Fenton 1972). During periods of mild ambient temperatures, activity and movement in and out of hibernacula has been observed in this species (Hitchcock 1965; Schwartz 1954). The maternity period lasts from May to August during which a single pup is born usually in May or June (Barbour and Davis 1969).

Eastern small-footed myotis are dietary generalist, feeding primarily on soft-bodied aerial invertebrates (Mossman et al. 2007). They use both aerial hawking and gleaning to capture prey (Mossman et al. 2007). Similar to other *Myotis* species, eastern small-footed myotis are nocturnal foragers, emerging from roosting sites at dusk. Their flight pattern is slow and generally erratic and usually at heights of 1 to 10 ft (0.3 to 3.0 m), which is distinctive to eastern small-footed myotis (Barbour and Davis 1969; van Zyll de Jong 1985).

2.2.2 Habitat Requirements

Eastern small-footed myotis are mostly found in mountainous regions; in or near deciduous forest, mixed deciduous-evergreen forest, or mixed forest and open farmland (NatureServe 2011); and at elevations of approximately 750 to 3,700 ft (240 to 1,125 m) (Best and Jennings 1997). In West Virginia, they have been found roosting in limestone caves during the spring and summer (Krutzsch 1966). They have been known to roost in caves, buildings, rock bluffs, talus slopes, and tunnels and beneath slabs of rock and stones (Best and Jennings 1997). Caves and abandoned mines are the only known hibernacula sites (Fenton 1972), where they occupy narrow wall crevices or under rocks on the floor (Davis 1955; Krutzsch 1966; Martin et al. 1966). Within these selected hibernacula sites, eastern small-footed myotis prefer the drafty entrances of open mines and caves where the humidity is relatively low (Barbour and Davis 1969; Fenton 1972). Caves and mines are also utilized for summer roosting, but summer roost site selection is similar to little brown bat and other *Myotis* species where buildings, bridges, hollow trees, sloughing bark, rock piles, and cliff crevices are utilized (Natureserve 2011).

2.2.3 Demographics

Little information exists on the demographic parameters of eastern small-footed myotis. Similar to most bats, they have low reproductive rates (one young per year) and relatively long life spans. They are known to live approximately six to 12 years. Best and Jennings (1997) estimated an annual survival rate of approximately 76% for males and 42% for females. Lower female survival rates have been attributed to the greater demands of reproduction on females, higher metabolic rates, longer sustained activity during the summer months, and greater exposure to disease-carrying parasites especially in maternity colonies (Hitchcock et al. 1984; Best and Jennings 1997).

2.2.4 Range and Distribution

Historically, eastern small-footed myotis has always been considered fairly rare with patchy distribution (Barbour and Davis 1969). Currently, they are known to occur from southern Canada south to Georgia and Alabama and west to Oklahoma, Arkansas, and Missouri, generally following the eastern mountain ranges (Thompson 2006). One hundred and twenty-five hibernacula have been reported across the species' range, though most contain just a few individuals; for this species, most of these occurrences have been in West Virginia, Virginia, New York, and Pennsylvania (Thompson 2006; NatureServe 2011).

2.2.5 Dispersal and Migration

Dispersal and migratory distances of eastern-small footed myotis are believed to be influenced by the availability of hibernacula and roosting sites across the landscape (Johnson and Gates 2008). They are generally believed to be sedentary or regional migrants (Fleming and Eby 2005) and have been found in late summer during periods of active migration for bats, but the whereabouts of these individuals during other seasons is generally unknown (Barbour and Davis 1969). Although little information exists about migration patterns of eastern small-footed myotis, Johnson and Gates (2008) documented females moving <165 ft (<50 m) between successive diurnal roosts during the summer maternity period, and they typically switched roosts every day unless inclement weather prevented foraging.

2.2.6 Potential Impacts from Wind Turbines

Two eastern small-footed myotis fatalities have been reported at a wind a project in southern Canada (Jacques Whitford Stantec Limited 2009). No fatalities of this species have been reported for wind projects within the Appalachian Mountain region (see Arnett et al. 2008). The two fatalities at the Canada site occurred in September, which would be considered the fall migration or swarming season for eastern small-footed myotis. With few examples of fatalities of this species, the risk from wind turbines is difficult to determine, but it is assumed that they are at risk due to their presence in areas where wind development is occurring.

Eastern small-footed myotis has been documented on the site during summer and fall mist-net surveys (Young and Gruver 2011). Both adult and juvenile individuals were captured during summer surveys, indicating that maternity colonies likely occurred within the nightly foraging range for this species. Potential impacts from the Project will likely include direct fatalities of eastern small-footed myotis and potentially loss of roost sites during clearing for construction of the 33-turbine phase. The actual presence of maternity roost sites is unknown, but given the results from the site-specific surveys, it is believed possible that maternity roosts for eastern small-footed myotis may occur on-site.

2.2.7 BRE HCP Benefits

The HCP proposes: (1) on-site measures to minimize impacts to all bats and (2) funding to be administered by NFWF for off-site conservation measures that would target Indiana bat maternity or winter habitat. Available information indicates that a turbine operating less during low wind speeds is less risky to all bats and therefore likely to reduce potential mortality impacts to eastern small-footed myotis. Under the assumption that the estimated reduction in all bats mortality (approximately 50% for a cut-in speed of 11.2 mph [5.0 m/s]) applies to all bat species, it could be expected that the on-site minimization measures would result in 50% fewer eastern small-footed myotis fatalities. The monitoring plan for the HCP is designed to detect all bat species and will estimate impacts for all bat species. Potential impact to eastern small-footed myotis from the project will be measured during the on-site monitoring studies.

Off-site habitat conservation measures for Indiana bats is likely to also benefit eastern small-footed myotis due to sympatric occurrence and general habitat similarities between these two species. Indiana bat and eastern small-footed myotis both occur in deciduous forest type habitats, although they will often roost in different micro-sites (e.g., trees versus rocks, respectively) and elevations. While the hibernation habits of eastern small-footed myotis are less well known than Indiana bat, they are known to use the same caves and mines used by other *Myotis* species and likely occur in Indiana bat hibernacula. Measures to protect Indiana bat habitat, either summer or winter, could also benefit eastern small-footed myotis.

2.3 Northern Myotis (Northern Long-eared Bat)

The northern myotis is a common bat species in the mid- to northeastern U.S., with continental range extending into southeastern and western Canada. The global status of the northern bat has been G4, which are species that are apparently secure (NatureServe 2011), and it currently has no special status in the state of West Virginia. The USFWS was petitioned to list northern myotis as threatened or endangered in August 2010 (Center for Biological Diversity 2010).

2.3.1 Life History and Characteristics

The northern myotis is a small bat weighing approximately 0.17 to 0.35 oz (5 to 10 grams) with yellow to brown coloration. Females tend to be larger and heavier than males (Caire et al. 1979). The northern myotis has large ears relative to other similar species and was previously named the northern long-eared bat.

In spring, females leave hibernacula and form maternity colonies of up to 60 individuals (Caceres and Barclay 2000). Parturition dates and subsequent weaning are likely dependent on regional conditions (Foster and Kurta 1999). Studies completed by Broders et al. (2006) over a three-year period in New Brunswick, Canada, found parturition to occur in mid- to late July. Other studies suggest that southeastern population parturition dates occur between mid-May and mid-June (Caire et al. 1979; Cope and Humphrey 1972).

Generally, female northern myotis roost communally, while males select solitary roosts (Caceres and Barclay 2000). Northern myotis have shown site fidelity related to summer roost habitat; however, studies by Foster and Kurta (1999) found that bats changed roost trees approximately every two days. Movement to hibernacula occurs as early as late July and extends as late as October. Copulation occurs outside of hibernacula during swarming behavior; however, fertilization does not occur until spring (Caceres and Barclay 2000).

Northern myotis are likely an opportunistic insectivore that primarily gleans prey from substrates (Faure et al. 1993). They are known to forage under the forest canopy at small ponds or streams, along paths and roads, or at the forest edge (Caire et al. 1979).

2.3.2 Habitat Requirements

Northern myotis most frequently select mature-growth forests with decaying trees and/or live trees with cavities or exfoliating bark during the summer maternity season (Lacki and Schwierjohann 2001; Ford et al. 2006; Foster and Kurta 1999). Day and night roosts are utilized by northern myotis during spring, summer, and fall with old-growth forest communities selected most frequently (Foster and Kurta 1999; Owen et al. 2003; Broders and Forbes 2004). Variation in roost selection criteria has been reported between northern myotis sexes, with females forming maternity colonies in snags, while solitary males roosted in live tree cavities (Lacki and

Schwierjohann 2001; Broders and Forbes 2004; Caceres and Barclay 2000). Broders and Forbes (2004) further reported that maternity colonies were more often in shade-tolerant deciduous stands in trees species that are susceptible to cavity formation. This is supported by Lacki and Schwierjohann (2001) findings that colony roosts were more likely to occur in stands with higher density of snags.

Mine and cave sites have been most often reported as hibernacula for northern myotis (Whitaker and Winter 1977; Stone 1981; Griffin 1940).

2.3.3 Demographics

The total population size of northern myotis is not clearly known; however, estimates suggest the population may be as small as 2,500 or as large as 1,000,000 individuals (Natureserve 2011). Similar to other bat species, northern myotis has a low reproductive rate, with females birthing one offspring per year. The sex ratio for northern myotis populations appears to be dominated by males, with multiple studies reporting higher percentages of males compared to females (Griffin 1940; Pearson 1962; Hitchcock 1949; Stone 1981). The skewed ratio is believed due to greater mortality among females. The northern myotis is a fairly long-lived species (Thompson 2006), with one individual reported living up to 19 years, suggesting long life-spans (Hall et al. 1957).

2.3.4 Range and Distribution

Northern myotis is known to occur from eastern U.S. and southeastern Canada west to Montana and British Columbia and south to northern Florida. Common hibernacula locations include Quebec, Ontario, and the New England states (Caceres and Barclay 2000). Barbour and Davis (1969) reported that the winter and summer geographic ranges of the species appear to be identical.

2.3.5 Dispersal and Migration

Little information exists on the migration patterns and dispersal of northern myotis. The geographic summer and winter ranges appear to be identical (Barbour and Davis 1969); however, it is believed that movement between hibernacula and maternity summer roosts is likely similar to other *Myotis* species and may vary regionally. Some studies have reported movements ranging between approximately 30 and 60 miles (approximately 50 to 100 km) from hibernacula to summer habitat (Caire et al. 1979; Griffin 1945), suggesting they are regional migrants. In managed forests of West Virginia, northern myotis utilized on average a 160.6-acre (65-ha) home range, and patches smaller than this likely represent unsuitable habitat (Owen et al. 2003). Females have been reported to move up to 6,500 ft (approximately 2,000 m) and males 3,300 ft (approximately 1,000 m) between roost sites (Broders et al. 2006).

2.3.6 Potential Impacts from Wind Turbines

Northern myotis have been documented fatalities at wind turbines at several wind projects including a few in the Appalachian Mountain region (see Arnett et al. 2008); however, the number of northern myotis fatalities reported has been low. For wind projects within the Appalachian Region, the percent of northern myotis of all bat fatalities has ranged from 0 to

0.7% (see Table 4.3 of the HCP). Similar to little brown bat, they are likely at risk of turbine collision throughout the non-hibernating seasons.

Northern myotis has been documented on the site during summer and fall mist-net surveys (BHE Environmental, Inc. 2005, 2006; Young and Gruver 2011) and was the most common of the *Myotis* species captured during the fall (Young and Gruver 2011). Both adult and juvenile individuals were captured during summer surveys, indicating that maternity colonies likely occurred within the nightly foraging range for this species. Information about nightly foraging range is limited, but individual roost sites may be more than a mile apart (Owen et al. 2003). Potential impacts from the Project will likely include direct fatalities of northern myotis and potentially loss of roost trees during clearing for construction of the 33-turbine phase. The actual presence of maternity roost trees is unknown, but given the results from the site-specific surveys, it is believed possible that maternity roosts for northern myotis may occur on-site.

2.3.7 BRE HCP Benefits

The HCP proposes: (1) on-site measures to minimize impacts to all bats and (2) funding to be administered by NFWF for off-site conservation measures that would target Indiana bat maternity or winter habitat. As with little brown bat and eastern small-footed myotis, available information indicates that a turbine operating less during low wind speeds is less risky to all bats and therefore likely to reduce potential mortality impacts for northern myotis. Under the assumption that the estimated reduction in all bats mortality (approximately 50% for a cut-in speed of 11.2 mph [5.0 m/s]) applies to all bat species, it could be expected that the on-site minimization measures would result in 50% fewer northern myotis fatalities. The monitoring plan for the HCP is designed to detect all bat species and will estimate impacts for all bat species. Potential impact to northern myotis from the project will be measured during the on-site monitoring studies.

Off-site habitat conservation measures for Indiana bats is likely to also benefit northern myotis due to habitat similarities between these two species. Indiana bat and northern myotis are often captured at the same locations during mist-netting surveys, and these two species frequently use the same hibernacula (Timpone et al. 2010). Measures to protect Indiana bat habitat, either summer or winter, will also benefit northern myotis.

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APPENDIX C

RESEARCH, MONITORING, AND ADAPTIVE MANAGEMENT PLAN

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1.0 INTRODUCTION

Beech Ridge Energy LLC (BRE), a wholly owned subsidiary of Invenergy, LLC, owns and operates the Beech Ridge Wind Energy Project (Project). The Project is located in Greenbrier and Nicholas counties, West Virginia (see Figure 1.1 in the Habitat Conservation Plan [HCP]). The Project's primary components, including wind turbines, access roads, transmission and communications equipment, storage areas, and control facilities, are located on a 63,000-acre tract owned by MeadWestvaco, a small portion of which (6,860 acres) will host facilities for the 100-turbine project.

BRE is applying for an incidental take permit (ITP) for the Project, pursuant to Section 10(a)(1)(B) of the *Endangered Species Act* (ESA). The issuance criteria for an ITP require the development and implementation of a HCP by the permit applicant. The HCP must specify, among other things, the measures the applicant will undertake to monitor, minimize, and mitigate the impacts of authorized incidental take.

The purpose of this Research, Monitoring, and Adaptive Management Plan (RMAMP) is to describe the research, monitoring, and adaptive management that BRE will implement to meet the requirements of applicable ESA regulations and to comply with policies described in the U.S. Fish and Wildlife Service (USFWS) HCP Handbook (USFWS and National Marine Fisheries Service 1996), as amended.

1.1 Biological Goals of the HCP

The following are the biological goals of the BRE HCP:

(1) Avoid and minimize bat mortality consistent with the best available scientific information.
(2) Avoid and minimize potential take of covered species over the term of the ITP by implementing wind project operational protocols learned through the RMAMP in consultation with USFWS.
(3) Mitigate unavoidable impacts to covered species by implementing habitat restoration or protection measures in key Indiana bat habitats within the Appalachian Mountain Recovery Unit.

To achieve the biological goal to avoid and minimize bat mortality consistent with the best available scientific information (Goal 1), BRE will 1) implement the RMAMP and, during the first three years of the ITP, determine baseline bat mortality conditions at the project and identify turbine operational protocols that will reduce bat mortality during periods of high activity and 2) implement BRE's Curtailment Plan which, based on the best available science, should reduce bat fatalities by 44-93% (Arnett et al. 2010).

To achieve the biological goal of avoiding and minimizing take of covered species over the term of the ITP (Goal 2), BRE will implement monitoring and adaptive management measures contained in the RMAMP. These measures are intended to detect take of the covered species and/or changes in bat mortality over the term of the ITP and permit BRE to implement operational protocols to ensure that BRE does not exceed the authorized level of take of covered species provided in the ITP. The annual take estimate prior to implementation of the operational protocols is 5.0 Indiana bats and 1.0 Virginia big-eared bat; again, the best available science suggests that implementation of operational protocols should achieve a 44-93% fatality reduction.

To achieve the biological goal of mitigating unavoidable impacts to covered species (Goal 3), BRE will select and implement habitat restoration or protection measures in key Indiana bat habitats within the Appalachian Mountain Recovery Unit or establish a conservation fund to implement such measures, in consultation with USFWS and West Virginia Department of Natural Resources (WVDNR).

To reduce mortality of all bats and to avoid/minimize potential take of covered species, BRE will raise the cut-in speed of all turbines from 7.8 mph (3.5 m/s) to 10.7 mph (4.8 m/s) for a period of 12 weeks between July 15 and October 15 from 0.5 hour before sunset for a period of five hours (curtailment period). Outside of the curtailment period (i.e., from October 16 through July 14 and after the five hours of curtailment from July 15 through October 15), turbines will be operated normally, with a 7.8-mph (3.5-m/s) cut-in speed. As described below, the effectiveness of this operational strategy (hereafter referred to as BRE's Curtailment Plan), as well as other operational strategies, will be evaluated through research, monitoring, and adaptive management. The expected benefits of BRE's Curtailment Plan are described and analyzed in Section 5.0 in the HCP.

For the purposes of the HCP and this RMAMP, the terms "Year 1," "Year 2," etc., refer to calendar years during which the RMAMP is fully implemented.

1.2 Research Goals

The goal of the research component of this RMAMP is to evaluate the effectiveness of different turbine operational protocols (e.g., changing turbine cut-in speeds during various times of the night) to avoid and minimize the take of listed bat species and reduce mortality of all bats.

Previous studies have documented that the majority of bat fatalities at wind turbines occur during low wind speeds during late summer and fall migration periods (Arnett et al. 2005, 2008). There are four known turbine operation/bat fatality studies conducted to date, two from the U.S. (Good et al. 2011; Arnett et al. 2009, 2010), one from Canada (Baerwald et al. 2009), and one from Germany (O. Behr, University or Erlangen, unpublished data). All four research studies evaluated the effects of increasing the wind speed at which turbines begin rotating and producing power (the turbine cut-in speed) on estimated bat fatalities and indicate that the number of bat fatalities can be reduced by curtailing turbine operations at low wind speeds. Bat activity tends to be greater during calm and low wind speeds, and thus more bats may be exposed to turbines in no- to low-wind conditions. Therefore, curtailing turbine operations during low wind speeds (when more bats are active) reduces bat exposure to turning turbine rotors.

BRE will conduct similar scientific research studies to investigate how turbine curtailment strategies can be used to minimize the take of Indiana bats and Virginia big-eared bats and to reduce mortality of all bats.

1.3 Monitoring Goals

1.3.1 Compliance Monitoring

Compliance monitoring will be conducted to verify that BRE is carrying out the terms of the HCP, permit, and Implementing Agreement (IA). Chapter 3 in this RMAMP describes compliance monitoring actions to be taken to ensure that authorized take limits are not being exceeded. The IA describes compliance monitoring actions to be taken to verify that the terms of the permit, HCP, and ITP are being implemented.

1.3.2 Effectiveness Monitoring

Effectiveness monitoring will be conducted to evaluate the effects of the permitted action and to verify that the HCP is achieving the biological goals and objectives. Chapter 3 in this RMAMP describes the effectiveness monitoring actions to be completed to validate the assumptions and predictions made in the HCP and to verify that the Project's siting, construction, operations, maintenance, and decommissioning conservation measures are achieving the stated biological goals and objectives.

The objectives of the monitoring component of the RMAMP are: (1) to refine estimates of the amount of Indiana bat, Virginia big-eared bat, and all bat fatalities and (2) to identify the circumstances and conditions under which fatalities are likely to occur. Conducted in conjunction with the research component, post-construction monitoring will enable BRE to identify operational protocols to avoid and minimize take of listed bats and to avoid and minimize bat mortality consistent with best available science.

The first three years of RMAMP implementation will include intensive monitoring using methods recommended for wind project monitoring (e.g., Wind Turbine Guidelines Advisory Committee [WTGAC] 2010), daily and weekly casualty searches at Project turbines, and surveys to measure potential biases (searcher efficiency, carcass removal, carcass distribution). Annual monitoring during all years will be less intensive, will be conducted by qualified personnel, and will be designed to ensure that avoidance/minimization strategies put in place as a result of the intensive studies are functioning effectively.

1.4 Adaptive Management Goals

BRE's adaptive management strategy (Chapter 5.0 in this RMAMP) (1) identifies the uncertainty and the questions that need to be addressed to resolve the uncertainty; (2) develops alternative operational strategies and determines which experimental operational strategies to implement; (3) integrates a monitoring program that is able to detect the necessary information for strategy evaluation; and (4) incorporates feedback loops that link implementation and monitoring to a decision-making process that results in appropriate changes in management.

Areas of the HCP requiring further evaluation include: 1) the actual levels of Indiana bat and Virginia big-eared bat take and all bat mortality occurring at the Project and 2) operational measures that can be implemented to reduce take of covered species and avoid/minimize all bat fatalities consistent with available science relative to established mortality for unrestricted turbine operations (baseline levels).

A Curtailment Plan and research on the effects of varying cut-in speeds are the proposed alternative strategies, and the adaptive management plan allows for altering these strategies based on data collected at the site during monitoring. The integrated monitoring program is designed to detect specific information on the amount of Indiana bat and Virginia big-eared bat take and all bat fatalities. Finally, the adaptive management plan includes feedback loops to evaluate data and inform management decisions to increase the effectiveness (including cost-effectiveness) and efficiency of the overall conservation plan.

Table 1.1 presents a summary of BRE's research and monitoring plan with those components of adaptive management that are related to the research. Additional adaptive management actions are discussed in Section 4.0 below.

Table 1.1 Summary of BRE's Research and Monitoring Plan.

	Intensive Monitoring		Annual Monitoring
Study Years / Element	Research (mid-July – mid-October)	Monitoring (April 1 – November 15)	Annual Monitoring (April 1 – November 15)
YEARS 1 – 3: INTENSIVE RESEARCH AND MONITORING STUDY, ANNUAL MONITORING			
Turbine Operational Protocol	Control and treatment turbines as defined in the next two rows	Year 1 : 10.7 mph (4.8 m/s) for 5 hours/night Year 2: based on Year 1 results Year 3: based on Years 1 and 2 results	Year 1: 10.7 mph (4.8 m/s) for 5 hours/night Year 2: based on Year 1 results Year 3: based on Years 1 and 2 results
No. control turbines	Year 1: 10 Year 2: based on Year 1 results Year 3: based on Years 1 and 2 results	NA	Year 1: 8 Year 2: based on Year 1 results Year 3: based on Years 1 and 2 results (these 3 years of weekly monitoring will be used, individually and combined, to establish baseline all bat fatality rates)
No. treatment turbines	Year 1: 20 (10 with raised cut in speeds for 5 hours/night, 10 with raised cut in speeds for all night) Year 2: based on Year 1 results Year 3: based on Years 1 and 2 results	NA	Year 1: 16 (8 with raised cut-in speeds for 5 hours/night, 8 with raised cut-in speeds for all night) Year 2: based on Year 1 results Year 3: based on Years 1 and 2 results
Search frequency	Daily	Daily	Weekly
Turbine selection	Systematically selected prior to monitoring season to cover geographic distribution; fixed for the monitoring season; treatments rotated nightly	Systematically selected prior to monitoring season to cover geographic distribution; fixed for the monitoring season;	Systematically selected prior to monitoring season to cover geographic distribution; fixed for the entire monitoring season
Types of animals searched for	All bats and birds		All bats and birds
No. and types of animals used in bias trials	50 small and 50 large bird carcasses, recently killed 100 recently killed bat carcasses		Biases determined during intensive monitoring
Fatality estimator used	Year 1: Shoenfeld, possibly Huso or others Year 2: Based on Year 1 results Year 3: Based on Years 1 and 2 results		Same as for intensive monitoring

Table 1.1 Summary of BRE's Research and Monitoring Plan.

Study Years / Element	Intensive Monitoring		Annual Monitoring
	Research (mid-July – mid-October)	Monitoring (April 1 – November 15)	Annual Monitoring (April 1 – November 15)
Metric to track take	Adjusted estimated Indiana bat take; adjusted estimated all bat take, evaluate possibility of using other surrogates		Adjusted estimated all bat take; possible use of other surrogates depending on results of Years 1 – 3
Metric to track the meet-and-confer trigger	In any given year, Indiana bat fatality estimated exceed 5.0 or Virginia big-eared eared bat fatality estimates exceed 1.0 or for three consecutive years, all bat fatality estimates exceed baseline all bat fatalities by more than the 90% confidence interval		In any given year, Indiana bat fatality estimated exceed 5.0 or Virginia big-eared eared bat fatality estimates exceed 1.0 or for three consecutive years, all bat fatality estimates exceed baseline all bat fatalities by more than the 90% confidence interval
Reporting interval	Annual		Annual
YEARS 4 THROUGH 25; INTENSIVE MONITORING AS NEEDED, ANNUAL MONITORING			
Monitoring	As needed intensive monitoring: If any of the meet-and-confer triggers are met, and BRE and the USFWS determine that an additional year of monitoring is appropriate, intensive monitoring will be conducted and will include daily searches of up to 24 turbines for one year		Weekly searches of 24 turbines
Turbine operational protocol	For as-needed intensive monitoring: to be determined during meet-and-confer		Approved operational protocol determined during 3-year research and monitoring study
No. control turbines	NA		NA
No. treatment turbines	NA		NA
Search frequency	For as-needed intensive monitoring: to be determined during meet and confer		Weekly
Turbine selection	For as-needed intensive monitoring: to be determined during meet and confer		Systematically selected prior to monitoring season to cover geographic distribution; fixed for the entire monitoring season
Types of animals searched for	For as-needed intensive monitoring: to be determined during meet and confer		All bats and birds
No. and type of carcasses in bias trials	For as-needed intensive monitoring: to be determined during meet and confer		5 recently killed bird carcasses 5 recently killed bat carcasses

Table 1.1 Summary of BRE's Research and Monitoring Plan.

Study Years / Element	Intensive Monitoring: Research (mid-July – mid-October)	Intensive Monitoring: Monitoring (April 1 – November 15)	Annual Monitoring: Annual Monitoring (April 1 – November 15)
Fatality estimator used	For as-needed intensive monitoring: to be determined during meet and confer		To be determined during 3-year intensive research and monitoring study
Metric to track take	For as-needed intensive monitoring: to be determined during meet and confer		Adjusted estimated all bat take; possible use of other surrogates depending on results of Years 1 – 3
Metric to track threshold for meet-and-confer	For as-needed intensive monitoring: to be determined during meet and confer		In any given year, Indiana bat fatality estimated exceed 5.0 or Virginia big-eared eared bat fatality estimates exceed 1.0 or for three consecutive years, all bat fatality estimates exceed baseline all bat fatalities by more than the 90% confidence interval
Reporting frequency	For as-needed intensive monitoring: to be determined during meet and confer		Annual

2.0 RESEARCH PROGRAM

2.1 Background

Four recent studies have shown that increasing turbine cut-in speed significantly reduces bat fatalities caused by wind turbines (Baerwald et al. 2009; Arnett et al. 2010; Good et al. 2011) (Table 2.1). Data from a fourth study, conducted in Germany, also show reductions in fatalities with raised cut-in speeds; however, the data are not readily available, and thus this study is not discussed further.

The first study was conducted at the Summerview wind farm in southwestern Alberta, Canada, in 2007. The project site is about 5,058 acres (2,023 ha) located in cultivated mixed agriculture and pasture. The project consists of 39 Vestas V80 1.8-megawatt (MW) turbines with 262-ft (80-m) diameter rotors mounted on 213-ft (65-m) towers arrayed in eight northwest/southeast-trending strings. Fatality rates of all bats were studied in 2005 and 2006 and were high both years, at approximately 21.7 bats/turbine (12.1 bats/MW) in 2005 and 26.3 bats/turbine (14.3 bats/MW) in 2006. Most fatalities occurred between August 7 and September 9 both years.

The research study was conducted in 2006 and 2007 between July 15 and September 30 to encompass the period of impact for hoary and silver-haired bats, the species with the highest fatality rates at this site. Turbine operation was altered only in 2007; 2006 data were used as the baseline.

Normal cut-in speed for the Vestas V80 turbine is 8.9 mph (4.0 m/s). For 15 experimental turbines, cut-in speed was raised to 12.3 mph (5.5 m/s); six additional turbines were idled (i.e., blade pitch angle was changed so that rotors were nearly motionless during low wind speeds). Experimental turbines were selected by dividing the project into four quadrants and randomly selecting turbines within each quadrant. During the study, eight turbines that were operated normally comprised the control group.

Weekly carcass searches were conducted at the 29 study turbines. Actual number of carcasses found was adjusted for searcher efficiency and carcass removal to estimate fatality rates (Baerwald 2008). Searches were conducted on a 171-ft (52-m) diameter plot.

A similar study was conducted at the Casselman wind farm near Rockwood, Somerset County, Pennsylvania, in 2008. The project site is located in second growth deciduous forest, open hay pasture, and open grassland of a reclaimed coal mine. The project consists of 23 General Electric (GE) 1.5-MW turbines with 253-ft (77-m) diameter rotors mounted on 262-ft (80-m) towers arrayed in two strings. Fatality rates of all bats were studied in 2008. The research study was conducted between July 26 and October 10, 2008, to encompass the period of highest impact for all bats.

Normal cut-in speed for the GE 1.5-MW turbine is 7.8 mph (3.5 m/s). The research component of this study evaluated the effects of raised cut-in speeds on bat fatality rates at 12 turbines. For each of the 12 experimental turbines, cut-in speed was raised to 11.2 mph (5.0 m/s) or 14.5 mph (6.5 m/s), and/or turbines were allowed to operate normally. Treatment received by each turbine

Table 2.1 Summary of Research Study Results, Alberta, Canada; Casselman, Pennsylvania; and Fowler Ridge, Indiana.

Alberta, 39 Vestas Turbines, July 15 – September 30, 2007, 171 ft (52 m) plot, weekly searches			
Control	Treatment	Treatment	Results
8 turbines, normal operation 8.9 mph (4.0 m/s) cut-in speed	15 turbines, 12.3 mph (5.5 m/s) cut-in speed	6 turbines, idling blades pitched to reduce rotation in low wind speeds	Treatment turbines killed fewer bats Raised cut-in speed = 7.6 $\pm$ 2.0 bats/turbine Idling = 8.1 $\pm$ 3.1 bats/turbine control = 19.0 $\pm$ 2.7 bats/turbine No difference between experimental treatments
Casselman, PA, 23 GE Turbines, July 26 – October 9, 2008, July 26 – October 8, 2009; variable plots up to 197 ft (60 m), daily searches			
Control	Treatment	Treatment	Results
12 turbines, normal operation, 7.8 mph (3.5 m/s cut-in speed)	12 turbines, 11.2 mph (5.0 m/s) cut-in speed	12 turbines, 14.5 mph (6.5 m/s) cut-in speed	Treatment turbines killed fewer bats Raised 11.2 mph (5.0 m/s) cut-in speed = 0.27 (95% CI: 0.07-1.05) bats/turbine Raised 14.5 mph (6.5 m/s) cut-in speed = 0.53 (95% CI: 0.20-1.42) bats/turbine Control = 2.04 (95% CI: 1.19-3.51) bats/turbine No detectable difference between experimental treatments 11.2 mph (5.0 m/s) cut-in speed most cost-effective way to reduce bat mortalities at a wind farm
Fowler Ridge, IN, 182 Vestas V82 1.65-MW, 40 Clipper C96 2.5-MW turbines, 133 1.5-MW GE SLE Turbines; April 13 – October 15, 2010, variable plots, weekly and daily searches			
Control	Treatment	Treatment	Results
18 turbines, normal operation, 7.8 mph (3.5 m/s cut in speed)	9 turbines, 11.2 mph (5.0 m/s) cut-in speed	9 turbines, 14.5 mph (6.5 m/s) cut-in speed	Treatment turbines killed fewer bats Raised 11.2 mph (5.0 m/s) cut-in speed = 7.0 (95% CI: 7.0-9.1) bats/turbine Raised 14.5 (6.5 m/s) cut-in speed = 3.0 (95% CI: 1.8-4.2) bats/turbine Control = 14.0 (95% CI: 11.6-16.5) bats/turbine Experimental treatments showed approximately 50% and 78% reduction in bat mortality

was changed nightly, so each night, each treatment was randomly assigned to four turbines. Over the course of 15 nights, each treatment occurred at each turbine five times, in random order.

Daily carcass searches were conducted at the 12 study turbines. Actual number of carcasses found was adjusted for searcher efficiency, carcass removal, and carcass distribution to estimate fatality rates. Searches were conducted on variable diameter plots up to a maximum of 197 ft (60 m) depending on surrounding vegetation.

The Fowler Ridge study was conducted at a large wind farm (600 MW) in Benton County, Indiana, in 2010. The project site is located in agricultural fields (corn, soybeans, hay) in a predominantly agricultural environment with little topographic relief or forest cover. Phase I consists of 122 Vestas V82 1.65-MW turbines and 40 Clipper C96 2.5-MW turbines, for a total of 301 MW of energy capacity. Phase II consists of 133 1.5-MW GE SLE Turbines with a total capacity of 199.5 MW. Phase III consists of 60 Vestas V82 1.65-MW turbines (99 total MW of capacity). While the three turbine types varied in size, the normal cut-in speed for all turbines at the site was 7.8 mph (3.5 m/s). The research study was conducted between August 1 and October 15, 2010, to encompass the period when impacts to bats were expected to be highest.

The research component of this study evaluated the effects of raised cut-in speeds on bat fatality rates at 27 turbines. The proportion of turbines selected for curtailment studies was representative of the proportion of each turbine type across the project area. For nine experimental turbines, cut-in speed was raised to 11.2 mph (5.0 m/s), nine additional experimental turbines had raised cut-in speeds of 14.5 mph (6.5 m/s), and nine turbines were allowed to operate normally. In addition, there were nine other control turbines that were not included in the study and not rotated among the treatments. Treatment received by each turbine was changed weekly, so each week, each treatment was randomly assigned to nine of the 27 turbines in the study. Over the course of 10 weeks, each treatment occurred at each turbine for 3-4 weeks, in random order.

Daily carcass searches were conducted at the 36 study turbines on cleared 262 x 262-ft (80 x 80-m) search plots. Actual number of carcasses found was adjusted for searcher efficiency and carcass removal to estimate overall project-related fatality rates. Observed fatality rates were compared among the treatment groups.

All three research studies showed that turbines operated with raised cut-in speeds killed fewer bats than the normally operating turbines by 44 to 93% (Baerwald et al. 2009; Arnett et al. 2010; Good et al. 2011). Bats may be killed by barotrauma, damage to respiratory tissue due to rapid changes in air pressure near rotating turbine blades, and blade strikes, so stationary or slowly rotating rotors pose little risk to bats. When GE turbine blades are fully feathered (i.e., oriented parallel to the wind) rotation is typically 1 to 2 rpm. Rotation can be as high as 9 rpm for turbines allowed to “hunt” the wind with blades pitched from 0 to 1 degree.

While it has been shown that impacts to bats are greater on nights with low wind speeds (Arnett et al. 2005; Young et al. 2009a, 2010), the variation in impacts to bats during the night is less understood. Nightly activity patterns of bats are variable, but activity is typically highest in the first few hours after sunset and tapers off during the remainder of the night (Hayes 1997; Arnett et al. 2005; Kunz 2004; Kunz and Lumsden 2003). Some studies have also shown increased bat activity in the hours preceding sunrise (Arnett et al. 2005). This nightly activity pattern suggests that exposure of bats to turbines is variable over a night. Horn et al. (2008) and Arnett et al. (2005) investigated the timing of nightly bat activity in relation to impacts from turbines through the use of thermal infrared video cameras. While their results confirmed typical bat activity patterns, the actual number of detected strikes with the infrared imagery was low (5 strikes from 10 turbines during 10 nights) (Horn et al. 2008), and patterns in impacts during a night were unclear. Five of the eight documented strikes reported in Arnett et al. (2005) occurred within approximately five hours of sunset. The results of nightly activity patterns combined with results of studies showing the influence of weather patterns and seasonal variation on wind turbine-caused bat mortality suggest that there may be identifiable periods of elevated risk for collisions. Thus, bat mortality could potentially be reduced by focusing mitigation efforts on these periods.

These findings thus form the basis for the research component of the BRE HCP: experimenting with raised cut-in speed during peak fall migration (see Section 2.2 below) and experimenting with changing the timing of raised cut-in speeds to target periods of peak bat activity.

BRE will ensure that the turbine rotors at the Project (both the existing GE turbines and the expansion turbines) remain fully feathered whenever wind speeds are below cut-in speed. Fully feathered blades are pitched (rotated) so that the rotor edge points directly into the wind, reducing rotor rotation speeds to less than 2 rpm. Since all of BRE's research turbines (control and treatment) will be fully feathered below cut-in speed, this study will not be able to compare the impacts of feathering turbines below cut-in speeds against turbines that do not feather whenever wind speeds are below cut-in speed (i.e., turbines that pitch rotors into the wind to increase rotor speeds, also knowing as free-wheeling or pin-wheeling).

2.2 Research Plan

2.2.1 Turbine Operational Protocols

During a 12-week period from mid-July to mid-October in Year 1, BRE will implement a research study to test the effects of increasing turbine cut-in speed to 10.7 mph (4.8 m/s) for the first five hours of the night and for the entire night. Protocols to be tested during Years 2 and 3 of the ITP will be determined in consultation with USFWS and WVDNR after consideration of results from Years 1 and 2 of the ITP, respectively.

Normal cut-in speed for the GE 1.5-MW turbine, 7.8 mph (3.5 m/s), has been shown to lead to higher bat fatality rates during fall compared with raised cut-in speeds (Arnett et al. 2010). Cut-in speeds of 11.2 mph (5.0 m/s) and slightly higher (12.3 mph [5.5 m/s]) significantly reduced bat fatalities at three wind farms (Baerwald 2007; Arnett et al. 2010; Good et al. 2011). The Casselman study clearly demonstrated, however, that an 11.2-mph (5.0-m/s) cut-in speed provided a cost-effective means for reducing bat mortalities, including reduction levels from 44 to 93%. Initially, BRE will test a slightly lower cut-in speed (10.7 mph [4.8 m/s]) to determine if similar reductions in bat fatalities can be achieved at the Project site while allowing the generation of more wind-generated electricity.

At this time, there are several ongoing studies of the effectiveness of alternative cut-in speed protocols at reducing bat mortality at other wind power projects, including studies using higher and lower cut-in speeds than the levels tested by the researchers cited above. Through the adaptive management process, BRE will have the ability to test adjustments to the turbine cut-in speeds based on the best available scientific information.

Since bat activity is expected to be higher during the first hours of the night (see Section 2.1 in this RMAMP) and since more hours of operation will result in more energy from a renewable source, BRE will also test the effects of raising cut-in speeds for the first five hours of the night (one-half hour before sunset to 4.5 hours after sunset) and then allowing normal operations for the remainder of the night. Both the raised cut-in speeds and the partial night of curtailment are aligned with what is known about bat behavior (i.e., they are not at risk during high winds and they forage more during the first hours of the night).

2.2.2 Experimental Design

Thirty turbines will be included in the Year 1 research study. As described below, BRE has determined that evaluation of 30 turbines (each turbine receives each treatment for 28 nights) is sufficient to evaluate the effects of the different operational protocols across the project site while at the same time meet requirements of the ITP to determine the level of take of Indiana bats (see Section 3.2.3 below). For each night, these 30 turbines will be randomly assigned to one of the following:

I. Cut-in speed increased to 10.7 mph (4.8 m/s) from 0.5 hour before sunset to 0.25 hour after sunrise) (entire night).
II. Cut-in speed increased to 10.7 mph (4.8 m/s) from 0.5 hour before sunset for a period of five hours.
III. Cut-in speed of 7.8 mph (3.5 m/s) 24 hours per day.

Turbine rotors will move slowly (1-2 rpm) prior to reaching the turbine cut-in speed. At cut-in wind speeds, the blades will pitch into the wind, rotor speeds will increase, and the generators will eventually close their electrical breaker and begin generating electricity at some slightly higher wind speed, when steady wind power is provided by the rotor to the generator.

Participants in the field study will not know which turbines are subject to which cut-in speed at any given time. The research study will be conducted for 12 weeks between mid-July and mid-October, the period when bat mortality is expected to be the highest (Johnson 2005; Arnett et al. 2008).

The power to detect effects is related to the number of nights a treatment is in effect at each turbine, in this case 28 nights. Based on BRE's power analysis (Table 2.2), 28 nights will be sufficient to detect effects among treatments, and this has been discussed with and confirmed by BRE's peer reviewers. Power to detect effects is also related to the number of hours that wind speeds fall within the experimental speeds—in the case of BRE's Year 1 experimental design, between 7.8 and 11.2 mph (3.5 and 4.8 m/s). Based on meteorological data from the sites,

Table 2.2 Power Analysis to Estimate the Number of Turbines Needed to Be Sampled in Each Treatment Group to Detect Reductions in Fatality Rates Due to the Treatment with 10 Treatment and 10 Control Turbines Searched Daily.

Sample Size Per Treatment	Mean Fatalities/Turbine (12 week study)	Effect Size	Difference in Mean Fatalities/Turbine (12 Week Study)	Power
10	12	20%	2.4	0.43
10	12	30%	3.6	0.70
10	12	40%	4.8	0.88
10	24	20%	4.8	0.67
10	24	30%	7.2	0.92
10	24	40%	9.6	0.99
10	48	20%	9.6	0.90
10	48	30%	14.4	0.996
10	48	40%	19.2	0.999

during the period from July 15 through October 15, wind speeds are between 7.8 and 11.2 mph (3.5 and 4.8 m/s) approximately 11% of the time or about 100 hours.

Reductions in bat mortality will be measured against fatality estimates from the 10 fully operational turbines (cut-in speed is 7.8 mph [3.5 m/s] 24 hours/day).

2.2.3 Turbine Control and Record Keeping

Each turbine includes a Supervisory Control and Data Acquisitions (SCADA) communications system that permits automatic independent operation and remote supervision, allowing continuous control of the wind farm to ensure optimal and efficient operation and early warning of potential problems. For this study, GE will provide a system modification to allow cut-in speed to be directly changed on individual turbines. Turbine cut-in speed will be controlled using SCADA software provided by GE to allow for changing cut-in speed for individual turbines at specific times of the day. SCADA data also provide detailed operating and performance information for each wind turbine, and BRE maintains a database tracking each wind turbine's operational history. For the purposes of this study, the SCADA system will be used to implement the turbine operational protocols that are the basis of the research study and to document that the study has been carried out as planned.

BRE will monitor turbine operations to ensure that the operational protocols are being implemented. Records will document the implementation of the approved turbine operational protocols (e.g., agreed upon cut-in speed and timing of cut-in speed adjustments) and also address ITP compliance monitoring requirements to provide assurances to the USFWS that the turbines are operating so as to minimize take of Indiana bats and Virginia big-eared bats and reduce mortality of all bats. Monitoring summaries will include: (1) a list of turbines included in the study; (2) a schedule of turbine rotation through treatment and control groups; and (3) study turbine start and stop times and cut-in wind speeds.

3.0 MONITORING STUDY PROTOCOL

3.1 Background

The monitoring study protocol is similar to protocols used at other wind projects in the U.S. (Erickson et al. 2000, 2003a, 2003b; Johnson et al. 2000; FPL Energy Inc. et al. 2001; Young et al. 2003, 2009a; Kerns and Kerlinger 2004; Arnett et al. 2005, 2009, 2010; Jain et al. 2007) and methods recommended for wind project monitoring (e.g., WTGAC 2010). The monitoring study protocol was developed with input from USFWS and WVDNR and using information from similar studies for wind energy development throughout the U.S.

Several different estimators have been proposed for fatality estimation (Shoenfeld 2004; Huso 2010; Jain et al. 2009). The properties of these estimators (biases and precision) can vary depending on the input parameters (e.g., carcass removal, searcher efficiency). For example, the Huso (2010) estimator will overestimate fatality rates when the carcass removal rate (average length of time a carcass lasts before being removed by scavengers) is long compared to the search interval unless the searcher efficiency rates have included the ability of carcasses to be missed on initial searches but found later. If daily searches are conducted, carcasses tend to last through multiple searches; however, if the searcher efficiency rates are estimated for a one-time search, the fatality rates will be overestimated by applying the same adjustments for all carcasses found. The Jain et al. (2009) estimator also requires this multiple search searcher efficiency (p value) and will have a similar characteristic (overestimate) if a single search probability of detection is used. The Shoenfeld (2004) estimator only uses a single search p but can underestimate the fatality rate, given that it assumes the probability of detection is constant across multiple searches.

For the research and monitoring components of this RMAMP, BRE intends to use the Shoenfeld estimator similar to the studies conducted at the Mountaineer, Myersdale, Mount Storm, and Casselman wind projects (Arnett et al. 2005; Young et al. 2009a; Arnett et al. 2010). Use of the Shoenfeld estimator will allow comparison with the other regional studies that are most similar to the Project; however, BRE will also evaluate the best available scientific information, in consultation with USFWS, related to estimators at the time that the studies are conducted and investigate the potential use of other estimators (e.g., the Huso estimator) and will make use of the appropriate estimator. A simulation study using the Shoenfeld estimator has been shown to predict low, moderate, and high level of impacts to bats with coefficients of variation in the range of 20-30% for a variety of study designs with variable search intervals, searcher efficiencies, carcass removal rates, and plot sizes (Sonnenberg and Erickson 2010). This estimator also had lower coefficients of variation when expected mortality was high, suggesting that the precision of this estimator is better in areas with high mortality. BRE will discuss this matter with USFWS and WVDNR at the time that the field study is completed to ensure that the most appropriate estimator(s) and statistical methods are applied to the study. The field studies are designed so that any of the above-referenced estimators can be used during data analysis.

3.2 Mortality Monitoring Plan

3.2.1 Species to be Monitored

Fatality monitoring studies conducted during the term of the ITP will include monitoring for Indiana bats, other bat species, and birds, including eagles and migratory birds. While a focus of the HCP monitoring plan is to evaluate take of Indiana bats, monitoring conducted under this plan will also provide information concerning mortality of other bat species and birds (discussed in BRE's Avian Protection Plan). Since Indiana bat fatalities are expected to be rare events and because the intensive monitoring study is designed to detect a rare event, the intensive monitoring study will be more than adequate to develop estimates for other bat and bird fatalities.

BRE has developed two levels of monitoring studies as a part of its overall monitoring strategy: (1) intensive monitoring for Indiana bats during Years 1-3 of the ITP to confirm mortality estimates and evaluate effectiveness of minimization measures and (2) annual monitoring during all years of the ITP to confirm mortality estimates for all bats and to verify that minimization measures remain effective.

The initial three-year intensive monitoring study (see Section 3.2.3 in this RMAMP) is designed to detect fatalities of Indiana bats and to allow estimates of Indiana bat take to determine success at meeting the HCP goals. Following completion of the three-year intensive monitoring study, the results of the studies and success at meeting the HCP goals will be evaluated. If avoidance and minimization goals have been met at the end of the three-year study and estimated take of Indiana bats and Virginia big-eared bats is at or below 2.5 or 0.5, respectively, during Years 4-25 of the ITP, then minimization measures developed during this period will be implemented for all turbines. Finally, annual monitoring will be conducted in parallel with intensive monitoring and in all other years to track overall trends in bat mortality, to confirm the accuracy of annual monitoring, and to determine the need for more intensive monitoring for covered species (see Section 5.0 below).

During Years 4-25 of the ITP, BRE will implement a surrogate species approach, using all bats as a surrogate, to monitor take of covered species using ratios developed during the first three years of intensive study. A surrogate approach to monitoring in Years 4-25 is warranted given that (1) it is not possible to meaningfully measure or detect take of covered species given that such take is an extremely rare event and (2) a surrogate species monitoring approach will provide adequate monitoring levels to ensure that the project remains in compliance with authorized take limits over the term of the permit. In addition, BRE will evaluate the reliability of other available surrogates for Indiana bat mortality (e.g., little brown bats, all *Myotis* species).

The activity and fatality patterns of migratory tree-roosting bats may be different from those of cave bats. Individuals with White Nose Syndrome (WNS) are likely weak and may have alternate commuting and foraging patterns to compensate for their condition. BRE has designed the monitoring study to include the entire bat-active season (see Sections 3.2.3 and 3.2.4 below) to cover possibility that unusual fatality patterns of species, not typically associated with turbine fatalities, may occur.

3.2.2 Permits and Wildlife Handling Procedures

3.2.2.1 Permits

Federal and state collecting/salvaging permits will be acquired prior to commencement of the study to enable field technicians (consultant searchers and BRE searchers) to collect and handle carcasses in compliance with laws pertaining to the collection and possession of wildlife and migratory birds.

3.2.2.2 Wildlife Handling Procedures

Handling During Monitoring. Collection of any federal or state endangered, threatened, or protected species or eagles found by consultant searchers or designated BRE searchers (see Section 3.2.5 in this RMAMP) will be coordinated with the USFWS and WVDNR. BRE will notify the USFWS within 24 hours of suspected identification of any endangered or threatened species injury or fatality or any injury or fatality of bald or golden eagles. All threatened or endangered species carcasses or eagle carcasses will be transferred to the USFWS. A chain of custody memo indicating the date, carcass identity, and signatures of personnel responsible for the transfer of any wildlife carcasses, including threatened and endangered species and eagles, will accompany the carcasses at the time of the transfer. A copy of the chain of custody memo will be maintained in the BRE project file.

All carcasses found, regardless of species, will be recorded and a cause of death determined, if possible, based on field inspection of the carcass. All carcasses found will be photographed to show field conditions and how the carcass appeared at first detection and to show diagnostic characteristics used for species identification. Any carcass requiring additional study for identification (e.g., feather spot, bat wing) will be labeled with a unique identification number, bagged and retained in an on-site freezer for future reference. All *Myotis* bats will be collected and provided to WVDNR, and to the USFWS if required by permit, for inspection and identification verification. For any unknown *Myotis* carcass found, genetic testing will conducted at BRE’s expense to determine species. A written record of lab results will be kept for each carcass and provided to USFWS and WVDNR. Written records also will be provided to USFWS of unidentified *Myotis* species for which genetic testing is determined not to be required (e.g., the carcass is determined not to be an Indiana bat based upon visual observations and/or body measurements).

Searchers will also be trained to inspect carcasses for signs of WNS and to provide a wing-damage index score (Reichard n.d.).

Migratory bird carcasses will be disposed of at the direction of the USFWS or according to USFWS permit conditions; non-protected or state-managed bird carcasses (e.g., European starling, upland game birds) will be disposed of at the direction of the WVDNR or according to permit conditions. All non-listed intact bat carcasses will be saved or frozen for potential use in the study or in studies independent of this monitoring program related to bat population sizes on a national level. Non-listed species bat carcasses will be disposed of at the direction of WVDNR or according to permit conditions if they are not used in the study or for other research. Listed bat carcasses will be given to the USFWS.

Any injured bird or bat found during the study will be treated as a casualty for the purposes of the data analysis and reporting; however, injured wildlife will be evaluated for potential rehabilitation. A qualified wildlife rehabilitation facility for injured birds and bats will be determined by BRE and approved by USFWS. All injured wildlife collected during the study will be transferred and released to the designated facility along with any pertinent information to facilitate rehabilitation.

Handling of Incidental Finds. Wind project casualties (fatalities or injured wildlife) may potentially be found by project personnel or others not conducting the formal searches. These casualties found in non-search areas or during periods outside of the standardized carcass searches will be treated as incidental finds. During the formal study period each year when non-study personnel discover a casualty, a digital photograph with a reference scale will be taken (if possible), and the casualty will be bagged by a permitted handler and stored in the on-site freezer. The location of the casualty will be marked in the field with a pin-flag, and a searcher will be notified to identify and record the find. Incidental discoveries found within search plots but not during scheduled searches will be included in the fatality estimation as if they would have been found during the next scheduled search. Incidental discoveries made outside search areas will be recorded in the overall data set but not included in the fatality estimation.

3.2.3 Intensive Monitoring (Years 1 – 3)

3.2.3.1 Study Design

The initial three-year intensive monitoring study is designed to detect fatalities of Indiana bats and to allow estimation of actual Indiana bat take to evaluate success of meeting HCP goals. As described below, a sampling approach that is designed to detect a rare event will be used to collect data during this intensive monitoring phase.

The intensive monitoring study contains three primary components: (1) standardized carcass searches, (2) searcher efficiency trials, and (3) carcass removal trials. The number of avian and bat fatalities attributable to collision with the wind turbines will be estimated based on the number of avian and bat fatalities found in search plots and whose death appears related to collision with or barotrauma from turbines. Total number of avian and bat carcasses will be estimated by adjusting for removal bias (e.g., scavenging), searcher efficiency bias, and casualty distribution (e.g., adjusting for carcasses potentially falling in non-searched areas within the search plot). Carcasses where the cause of death is not apparent will be included in the fatality estimate.

For the intensive monitoring, to be conducted from April 1 through November 15, 30 turbines will be selected for daily surveys; for annual monitoring, 24 turbines will be selected for weekly searches. Statistical simulations were conducted that model this study approach to determine the probability of finding one or more Indiana bat fatality if the predicted estimate of take was to occur, approximately 10 Indiana bats over three years.[35] For the simulation, 10 turbines were

[35] The estimate for Indiana bat mortality without any curtailment is 4.6 bats/year and assuming a 50% reduction due to curtailment 2.3 bats/year. Under the proposed research schedule, 10 turbines will be fully operational. For the three years of intensive monitoring and because the actual reduction in bat mortality is unknown at this time, it was

randomly selected from the 100 with replacement for the turbines where the fatalities occur. The appropriate number of turbines to be searched (54 total turbines) were randomly selected, 30 daily and 24 weekly. Finally, a weighted coin was flipped for any fatality on the search turbine—weighted by the recovery rate—to determine whether the fatality was found or not. This was done 1,000 times, and then the proportion of the time 0, 1, 2, 3, or 4 fatalities were found was determined. This whole process was repeated 1,000 times and averaged to get the probabilities of finding one or more Indiana bat (Table 3.1).

Based on this simulation, if 30 turbines are searched daily and 24 turbines are searched weekly and recovery of fatalities (i.e., a fatality is not removed and is detected) is 50% on average for daily searches and 20% on average for weekly searches, approximately 1.98 Indiana bats would be recovered over the three-year study, and there is approximately 89% probability of finding one or more Indiana bat fatality.

This is a conservative estimate, as monitoring studies in the Appalachian region have generally had recovery rates from 50% to 75% when daily searches were conducted and from 10% to 30% when weekly searches were conducted for plots approximately 2 acres (7,841 m^2) in size (Young et al. 2009a; Arnett et al. 2005, 2009). In addition, because the current size of the project is only 67 turbines, during the first year of study the proportion of turbines sampled is higher and thus the probability of detecting an Indiana bat improves slightly. While ensuring a greater than 85% likelihood that Indiana bat fatalities will be detected, this study design also enables estimate of Indiana bat mortality from the project, calculated from biases (e.g., carcass removal, search efficiency) measured during the field study.

Table 3.1 Approximate Probabilities of Detecting Indiana Bat Fatalities Under Different Sample Sizes of Turbines and Likelihood of Recovering an Indiana Bat Carcass If It Occurred on a Search Turbine During a 3-Year Period.

						Probability Estimates				
No. of daily turbines searched	Percent recovered on daily turbines[1]	No. of weekly turbines searched	Percent recovered on weekly turbines[1]	No. of Indiana bat fatalities[2]	Expected average number fatalities found	No Indiana bat fatalities are found	1 or more Indiana bat fatalities are found	2 or more Indiana bat fatalities are found	3 or more Indiana bat fatalities are found	4 or more Indiana bat fatalities are found
24	50	24	20	10	1.68	0.16	0.84	0.52	0.23	0.07
30	50	24	20	10	1.98	0.11	0.89	0.62	0.32	0.12
36	50	24	20	10	2.28	0.08	0.92	0.70	0.41	0.18

[1] Searcher efficiency and removal combined – i.e., a carcass is not removed and is detected.

[2] The estimate for Indiana bat mortality without any curtailment is 5.0 bats/year and assuming a 50% reduction due to curtailment 2.5 bats/year. Under the proposed research schedule, 10 turbines will be fully operational. For the three years of intensive monitoring, and because the actual reduction in bat mortality is unknown at this time, it was estimated that approximately 10 Indiana bat fatalities could over the first three years of monitoring during which some turbines would be operating normally

estimated that approximately 10 Indiana bat fatalities could over the first three years of monitoring during which some turbines would be operating normally.

A statistical power analysis using Minitab (Minitab 14 Statistical Software 2005) was used to estimate the number of turbines needed to be sampled in each treatment group to detect reductions in fatality rates due to the treatment. Fatality counts were generated for each turbine on a weekly basis using a Poisson distribution, which is supported by the results from previous monitoring studies for wind projects in the Appalachian Mountain region (Arnett et al. 2005, 2010; Young et al. 2009a, 2009b, 2010). The power analysis was conducted assuming pairwise comparisons among treatments using a two sample t-test for 4, 8, and 12 turbines per treatment. The casualty counts for each turbine used a Poisson distribution and assumed an overall fatality rate similar to the other monitored wind projects in the region, roughly two bat fatalities per turbine per week (see above references).

The results of the analysis indicate that the power to detect between 30 and 40% changes in all bat mortality sampling 10 turbines per treatment exceeds 80% (Table 3.2). That is, the study would be able to statistically detect (with greater than 80% power) a difference of 30-40% between the means. For example, if the control had a mean of 4 bats/turbine and the treatment had a mean of 2.4 (4-(0.4*4)), probability of a type 2 error (determining that these means are the same when they are actually different) would be less than 20%.

These power analyses provide a reasonable guide to the ability to detect effects from this study. The power to detect experimental effects will depend on site-specific conditions (e.g., scavenger removal and searcher efficiency), and the impacts of these site-specific conditions on the research results are as yet unknown but will be determined. The analyses to be conducted for the Project are based on best available scientific data and include estimation of the scavenging and carcass removal biases. Power to detect effects will be evaluated during these analyses, which in turn will inform adaptive management decisions, including decisions regarding study design (Chapter 4.0).

Table 3.2 Approximate Power to Detect Changes in Effects of 20%, 30%, or 40% for Different Treatment Group Sample Sizes and Assuming an Average Weekly Fatality Rate of 2 Bats Per Turbine.

Sample Size Per Treatment	Mean Weekly Fatalities/Turbine	Effect Size	Assumed sd Diff	Power
4	2	20% = 0.4	1.05	0.34
4	2	30% = 0.6	1.07	0.57
4	2	40% = 0.8	0.55	0.76
8	2	20% = 0.4	0.74	0.54
8	2	30% = 0.6	0.76	0.82
8	2	40% = 0.8	0.77	0.96
12	2	20% = 0.4	0.61	0.69
12	2	30% = 0.6	0.93	0.93
12	2	40% = 0.8	0.95	0.99

3.2.3.2 Field Methods

Selection and Delineation of Carcass Search Plots. The Year 1 study will include the existing 67-turbine phase; additional turbines (from the 33-turbine phase to be constructed) will be included in the study once that phase is operational. Thirty turbines will be surveyed daily for the study period (April 1 through November 15). Search plots will be determined using a systematic approach with a random start point. During Year 1, approximately every second turbine (30 out of 67) will be chosen for the study to provide relatively even distribution over the existing project. The initial turbine will be randomly chosen to remove subjectivity in the turbine selection.

Results from previous studies have shown that bat casualties tend to fall closer to the turbine tower than bird casualties (e.g., Arnett et al. 2005, 2008; Young et al. 2009a). Studies at Mountaineer, West Virginia, showed that most bat fatalities fell within 98 ft (30 m) of the turbine (Kerns and Kerlinger 2004) and further that there were no significant differences in carcass distribution among species or cardinal direction. Larger search plots are possible in open prairie landscapes, but because habitat in the Project area is a mosaic of forest, re-growth, shrub-dominated areas, steep rocky areas, and cleared areas (due to timber harvest, mining, and development of the wind farm), search plots will be delineated as the area around each turbines that is clear of thick vegetation and is not steep or covered with waste rock from excavations. Thus, plot size will be variable but on average will cover 53,092 ft^2 (5,027 m^2), or the equivalent of 130-ft (40-m) radius search plots. A plot of this size can also be more easily maintained by mowing for the life of project to enable long-term monitoring.

A 130-ft (40-m) radius search plot will be delineated in the field around each study turbine. Plot boundaries, habitat, and visibility class (easy, moderate, difficult) within each search plot will be mapped using a GPS. Searcher efficiency and carcass removal will be measured by visibility class (see below). To improve searcher efficiency, search plots will be mowed as needed during the growing season.

Visibility classes will be mapped in the field using the following criteria (cover and height based on an ocular estimate):

- Easy: Less than 20% vegetation cover and vegetation less than 6 inches high
- Moderate: between 20% and 80% vegetation cover; vegetation 6 to 12 inches high
- Difficult: greater than 80% vegetation cover; vegetation greater than 12 inches high

BRE’s commitment to mowing will generally ensure that all vegetated areas are in easy to moderate visibility classes. There may be rocky areas or other un-mowable areas that will be classified as difficult.

Information regarding spatial distribution of fatalities within the search plots will be used to calculate a correction factor for fatalities that likely fell outside the 130-ft (40-m) radius search area or in unsearched areas within plots and therefore were not available to be found. This adjustment to the fatality estimates accounts for the unsearched areas (both within and beyond the search plot boundaries) when calculating the final estimate of overall mortality (e.g., Arnett et al. 2005, 2009; Erickson et al. 2003b).

Timing and Duration. Monitoring will occur annually for the duration of the permit from April 1 to November 15 during the period when bats are active.

Standardized Carcass Searches. Plots will be systematically searched on a daily basis for avian and bat fatalities that are attributable to collisions with turbines or barotrauma. Searchers trained in proper search techniques will conduct the carcass searches. Initially, transects will be set approximately 16 ft (5 m) apart in the area to be searched. Searchers will walk at a rate of approximately 150-200 ft/min (45-60 m/min) along each transect searching both sides out to approximately 7-10 ft (2-3 m) for casualties. Search area and speed may be adjusted if vegetation variation within the search area warrants adjustment and/or after evaluation of the searcher efficiency trials.

The condition of each carcass will be recorded using the following condition categories:

- Live/Injured – a live or injured bird or bat
- Intact – a carcass that is completely intact, is not badly decomposed, and shows no sign of being fed upon by a predator or scavenger
- Scavenged – an entire carcass, which shows signs of being fed upon by a predator or scavenger, a portion(s) of a carcass in one location (e.g., wings, skeletal remains, legs, pieces of skin, etc.), or a carcass with heavy insect infestation
- Feather Spot – 10 or more feathers or 2 or more primary feathers at one location indicating predation or scavenging

For all casualties found, data recorded will include species, sex and age when possible, date and time collected, GPS location, physical condition (e.g., live, intact, scavenged, feather spot), estimated time of death, and any comments that may indicate cause of death. All casualties will be photographed as found and plotted on a map of the study area showing locations of wind turbines and associated facilities such as access roads, the O&M building, and the substation. Dominant vegetation cover and visibility index for the carcass location will also be recorded.

Searcher Efficiency Trials. Searcher efficiency trials will be conducted to estimate the percent of avian and bat fatalities that are found by searchers. These trials will be conducted in the same search plots and during the same periods as carcass searches throughout the intensive monitoring period. Searcher efficiency will be estimated by carcass size and habitat visibility class. Estimates of searcher efficiency will be used to adjust the number of carcasses found thus correcting for detection bias.

During the study period each year, approximately 200 recently killed bat carcasses, 200 recently killed small bird carcasses, and 100 recently killed large bird carcasses will be used in the searcher efficiency trials. This number of trial carcasses will provide sufficient sample sizes for estimation of searcher efficiency by each size class, for three visibility classes, for three seasons, and for the intensive monitoring study and for annual monitoring (see Section 3.2.5 below). Trial carcasses will be distributed approximately equally between each of three previously mapped visibility classes. Species such as house sparrows, quail, and European starlings will be used to represent small birds; rock doves (pigeons) and commercially raised hen mallards or hen pheasants will be used to represent medium-sized to large birds. Non-listed bat species carcasses recovered during the study will be re-used in the searcher efficiency trials, if allowed by permit. Brown mice may be used to represent bats if bat carcasses are not available.

To obtain the preferred sample sizes (see above) without substantially adding to the number of carcasses in search plots, trials will be conducted at all 30 turbines for the intensive monitoring and all 24 turbines for the annual monitoring (see Section 3.2.5 below) throughout the study period and in varying weather conditions. All trial carcasses will be placed by persons other than searchers at predetermined randomly selected locations within search plots prior to the carcass search on the same day. If avian scavengers (e.g., ravens) appear to be attracted by trial carcass placement, trial carcasses will be distributed before dawn. Carcasses will be dropped from shoulder or waist height to simulate a falling bird or bat.

Each trial carcass will be discreetly marked (e.g., a small piece of tape around a leg) so that it can be identified as a trial carcass. The number and location of trial carcasses found during a standardized search will be recorded. The number of carcasses available for detection but that were not found during each trial will be determined immediately after the daily search by the person responsible for distributing the trial carcasses. Trial carcasses that were not found the first day will be left in place for possible detection on day two, day three, day four, etc. The presence of the carcass (i.e., availability for detection) will be determined each day of the trial immediately after the carcass search survey for that day. The daily number of trial carcasses used will be unknown to the searchers.

Carcass Removal Trials. Carcass removal trials will be conducted to estimate the length of time avian/bat fatalities remain in the search area and will be conducted throughout the three-year intensive study period. Estimates of carcass removal rates will be used to adjust the number of carcasses found by correcting for removal bias. Carcass removal includes removal by predation or scavenging or removal by other means such as mowing.

To minimize the possibility of attracting scavengers to the search turbines by providing an additional food source, removal trial carcasses will be placed at turbines that are not included in the set of 30 intensive monitoring search turbines or the 24 annual monitoring turbines (see Section 3.2.5 below). Also, to simulate search conditions at the 54 search turbines, at which vegetation will be mowed as needed, vegetation at the carcass removal trial turbines will also be mowed.

During the study period each year, approximately 100 recently killed bat carcasses, 100 recently killed small bird carcasses, and 50 recently killed large bird carcasses will be used in the carcass removal trials. This number of trial carcasses will provide sufficient sample sizes for estimation of carcass removal by each size class, for three visibility classes, and for three seasons. Carcass removal rates determined during these trials will be used to estimate fatality rates for the intensive monitoring and annual monitoring components of the monitoring plan (i.e., for the duration of the permit, but see below commitment to spot check these rates during annual monitoring). Trial carcasses will be distributed approximately equally between each of previously mapped three visibility classes. Trial carcasses (rock doves, quail, etc.) will be similar to those used for the searcher efficiency trials.

A typical carcass removal trial will occur over a 14-day period unless all trial carcasses are removed sooner. For each trial, between 10 and 15 carcasses will be placed within 130 ft (40 m) of predetermined turbines that are not included in the 54 carcass search turbines but are spread throughout the project so as not to spatially concentrate carcasses. After the 14-day period, or when all carcasses have been removed, the next set of carcasses will be placed. Using this method of staggered carcass placement, removal trials will occur throughout the study period to incorporate the effects of varying weather conditions and scavenger abundance.

Carcass removal trial carcasses will be checked for a maximum of 14 days as follows: once a day for the first five days of the trial and then on approximately day 7, day 10, and day 14. The schedule may vary depending on weather and coordination with the other survey work. Trial carcasses will be marked discreetly (e.g., tape on a leg) for recognition by searchers and other personnel. Trial carcasses will be left at the location until the end of the 14-day trial. Any remaining trial carcasses or evidence of the carcass (e.g., feather spot) will be removed at the end of the 14-day period. If a significant number of carcasses remain after the 14-day trial period, carcasses will be left in the field for an additional 7 days to help estimate carcass removal rates.

3.2.4 Annual Monitoring

3.2.4.1 Collecting and Salvage Permits

Federal and state collecting/salvaging permits will be acquired prior to commencement of the study to enable BRE searchers to collect and handle carcasses in compliance with laws pertaining to the collection and possession of wildlife and migratory birds.

3.2.4.2 Study Design

Annual monitoring will be conducted during all years of the ITP. BRE will assign specific personnel (BRE searchers) to conduct annual monitoring. Annual monitoring is designed to measure impacts to all bat species from the facility and to confirm that no significant increase in overall bat mortality has occurred relative to the initial three-year intensive monitoring program. After the three-year program, BRE will have baseline data for fully operational turbines and for turbines subject to operational restrictions from which to measure changes in all bat fatalities. A significant change in overall bat mortality is defined as a measurable change in the preceding three-year average bat mortality relative to the average estimated mortality of all bats determined during the initial three-year period of the ITP. Comparisons will be evaluated using a t-test, with alpha-value of 0.10 indicating a significant difference. By using an alpha-value of 0.10, the test is more likely to conclude that the overall bat fatalities observed during annual monitoring are different from the three-years of intensive monitoring, thus indicating the need for more intensive monitoring.

Annual monitoring will include standardized carcass searches to be conducted by BRE searchers at a sample of 24 turbines and recordation of incidental finds found elsewhere in the project. All carcasses will be recorded and a cause of death determined, if possible. Total number of avian and bat carcasses will be estimated by adjusting for removal bias, searcher efficiency bias, and carcass distribution. Annual monitoring will occur from April 1 to November 15 each year.

A sampling approach will be used for annual fatality monitoring and evaluation, and the study includes standardized carcass searches. Twenty-four turbines will be selected using a systematic approach with a random start point. Approximately every third or fourth turbine (24 out of 67 or 100, respectively) will be chosen for the study to provide relatively even distribution over the entire project. The initial turbine will be randomly chosen to remove subjectivity in the turbine selection, and then approximately every third or fourth turbine in the strings will be included in the study. Twenty-four turbines (excluding turbines in the intensive studies) will be surveyed on a weekly basis from April 1 to November 15. This level of sampling effort will provide a greater than 85% percent probability of detecting 25-50% changes in mortality of all bats (Table 3.3). Annual monitoring plots will be mowed as needed during the growing season and rotated over the years to insure that all turbines are searched periodically over the life of the permit.

During the first three years of annual monitoring (coinciding with the initial intensive monitoring period), the 24 annual monitoring turbines will be divided into the same treatment groups as the intensive monitoring study to provide comparable data. Beginning in Year 4 of the ITP, annual monitoring will occur at turbines operating under operational protocols established after the intensive monitoring period unless BRE, after discussion with the USFWS, elects to conduct additional intensive monitoring as provided in Section 4.3.1 below. If BRE conducts an additional year of intensive monitoring, then beginning in Year 5 of the ITP annual monitoring will occur at turbines operating under established operational protocols.

3.2.4.3 Field Methods

The timing and duration of annual monitoring in Years 4-25 will be the same as for the annual monitoring conducted during the intensive monitoring study in Years 1-3 (from April 1 to November 15). The plot for each search turbine will be similar to the intensive monitoring with a maximum radius of 130 ft (40 m) from the selected turbines. The annual monitoring search plots will be mowed approximately twice per month during the monitoring period (April 1 – November 15) to facilitate the carcass searches and minimize vegetation visibility class differences.

Table 3.3 Approximate Power to Detect Changes in Fatality Rate of 10%, 25%, or 50% from One Year to the Next when the First Year Is Assumed to Have 27 Bat Fatalities Per Turbine Per Year.

Total Turbines	Mean Fatalities/ Turbine/Year	Effect Size (Fatalities/Turbine/Year)	Assumed Pooled sd	Power
24	27	10% = 2.7	5.3	0.535
24	27	25% = 6.75	5.5	0.994
24	27	50% = 13.5	5.8	1.000

Standardized carcass searches will be conducted using the same methods as during the three-year intensive study, except that searches will occur weekly. Searcher efficiency and scavenger removal rates determined during the intensive three-year study would be used in the calculation of fatality estimates; however, searcher efficiency and scavenger removal rates will be spot-checked each year of annual monitoring to ensure that initial estimates continue to be valid. During the three year intensive monitoring, the searcher efficiency trials will include both the intensive monitoring and the annual monitoring turbines. Searcher efficiency of the biologist and BRE searchers will be combined to generate the estimate of searcher bias. Carcass removal rates as determined during the intensive monitoring studies will be applicable to the entire project area and used to generate the fatality estimates from annual monitoring.

3.2.4.4 Personnel Training

BRE searchers will be full-time BRE employees who will be trained by qualified biologists in conducting: (1) standardized carcass searches and search protocols; (2) bird and bat identification and procedures to confirm identifications of rare species; and (3) wildlife handling procedures for all dead or injured wildlife discovered at the Project.

Standardized Carcass Searches. BRE searchers will be trained by a qualified biologist of BRE's choice, most likely the biologist conducting the intensive three-year monitoring study. Training will include:

- Location, size, and configuration of each search plot and how to record carcass location;
- Knowledge of the visibility classes within each plot;
- Start and stop points and width of search transects;
- Search/walking speed;
- Practice searches with planted carcasses;
- Familiarity with data sheets;
- Recording data and observations that assist with data interpretation;
- Photographing carcasses; and
- Procedures for handling, storing, and transmitting bat carcasses for positive identification.

During annual monitoring, the BRE searchers will periodically spot-check searcher efficiency and scavenger removal rates. For searcher efficiency, during each of the three monitoring seasons 10 small bird or bat carcasses (30 total carcasses) will be placed at search turbines. BRE searchers will not know when or how many carcasses will be placed. No more than one carcass will be placed at any search turbine, and trials will occur throughout each season to minimize concentrating carcasses in space or time. Over the annual monitoring period, the searcher efficiency rate will be compared to the searcher efficiency rate determined during intensive monitoring using a t-test to determine if searcher efficiency has changed appreciably such that adjustments to the annual monitoring study should be made.

For scavenger removal, during each of the three monitoring seasons 10 small bird or bat carcasses (30 carcasses total) will be placed near turbines other than annual search turbines and monitored daily for 14 days or until they have been removed. No more than one carcass will be placed at any turbine, and the trial will occur throughout each season to minimize concentrating carcasses in space and time. Over the annual monitoring period, the average length of stay of carcasses will be compared to the carcass removal rate during intensive monitoring using a t-test to determine if removal rate has changed appreciably and evaluate the need for further removal rate study.

Bird and Bat Identification. BRE searches will be permitted to handle bird and bat carcasses as described in Section 3.2.2 in this RMAMP. Any unknown carcasses or those requiring additional study for identification (e.g., feather spot, bat wing, *Myotis* bats) will be labeled with a unique identification number, bagged, and retained for future reference. All bats will be collected and provided to WVDNR and/or USFWS for inspection and identification verification.

Wildlife Handling Procedures. Prior to the initiation of the annual monitoring period (April 1 – November 15), BRE will conduct training sessions for project personnel involved in the monitoring. The training will include bird and bat identification, data collection, and wildlife handling procedures described in Section 3.2.3.2 in this RMAMP.

4.0 DATA ANALYSIS AND REPORTING

4.1 Data Analysis

Data analysis methods are summarized in Table 4.1 and described below.

4.1.1 Monitoring – Estimating and Comparing Fatality Rates

4.1.1.1 Estimation of Fatality Rates

The estimate of the total number of wind turbine-related fatalities will be based on four components: 1) observed number of carcasses, 2) searcher efficiency expressed as the proportion of trial carcasses found by searchers, 3) removal rates expressed as the length of time a carcass is expected to remain in the study area and be available for detection by the searchers, and 4) the estimated percent of casualties that likely fell in unsearched areas based on the distribution of observed casualties and percent of area searched within the 130-ft (40-m) radius plot.

Fatality estimates will be calculated using the best available method or methods and with consideration for new methods that may be developed in the interim between issuance of the ITP and completion of the field studies. BRE will use the statistical formula put forth by Shoenfeld (2004) that has been used at numerous wind project monitoring studies across the U.S. including the regional studies at Mountaineer, Myersdale, Mount Storm, and Casselman, and thus use of the Shoenfeld estimator will allow comparison with the other regional studies that are most similar to the Project. However, BRE will also evaluate the best available scientific information, in consultation with USFWS, related to estimators at the time that the studies are conducted and investigate the potential use of other estimators (e.g., the Huso estimator) and will make use of the appropriate estimator. Whatever method is chosen will provide a total estimate of fatalities for the project, accounting for the above-mentioned biases, as well as variability over vegetation visibility classes and proportion of the searchable area within the study plots. Carcass detection (searcher efficiency) rates will be estimated by major habitat type, carcass size, and season and for search day post-death. Data will be pooled across seasons if detection rates are not significantly different between seasons. The following statistical methods from the Shoenfeld estimator will be used and illustrate the analysis process.

Observed Number of Carcasses. The average number of carcasses detected per turbine is:

$$\bar{c} = \frac{\sum_{i=1}^{k} c_i}{k}$$

where c_i is the number of carcasses detected at turbine i for the period of study, and k is the number of turbines searched.

Table 4.1 Summary of Study Components, Year of RMAMP, Metrics, Methods/Statistical Tests, and Thresholds to Be Used during Data Analysis for Research and Monitoring.

Study Component/ Year of RMAMP	Metric	Method/Statistical Test	Threshold
Monitoring – Estimating and Comparing Fatality Rates			
Annually	Estimates of fatality rates	Shoenfeld estimator or best available	NA
Annually	Fatality rates categorized by species, season, and location	Tabular summaries, graphs, t-tests, ANOVA	NA
Annually	Fatality rates correlated with wind speed, precipitation, temperature, and barometric pressure	Least squares, regression lines, interaction plots, univariate association analyses (e.g., Pearson's correlations, simple linear regression), generalized linear models, and multiple regression	NA
Years 1-3	Fatality estimate derived from intensive monitoring compared with annual monitoring	t-test	P>0.10
Annually	Three-year average overall bat fatality estimates compared with three-year average of intensive all bat fatality estimates	t-test	P>0.10
Annually	Spot checks on annual monitoring searcher efficiency and scavenger removal	Tabular summaries, graphs	NA
Research – Control vs. Treatment Tests			
Years 1-3	Control vs. treatment (raised cut in speed)	ANOVA	P>0.10
Years 1-3	Control vs. treatment (time of night)	ANOVA	P>0.10
Years 1-3	Treatment (raised cut-in speed) vs. treatment (raised cut-in speed for partial night)	ANOVA	P>0.10

Estimation of Searcher Efficiency. Searcher efficiency is expressed as p, the estimated proportion of trial carcasses found by searchers. The variance of the estimate, *v(p)*, will be calculated to inspect the data for quality assurance purposes and will be calculated using the formula:

$$v(p) = \frac{p(1-p)}{d}$$

where d is the total number of carcasses placed. Carcass detection rates will be estimated by major vegetation visibility class (easy, moderate, difficult), carcass type/size (bat, small bird, medium/large bird), and season (spring, summer, fall). Data will be pooled across seasons if detection rates are not significantly different between seasons.

Estimation of Carcass Removal. Estimates of carcass removal are used to adjust carcass counts for removal bias. Carcass removal includes removal by predation, scavenging, or other means. The length of time a carcass remains in the study area before it is removed is denoted as t_i. Average carcass removal time is expressed as $\bar{t}$:

$$\bar{t} = \frac{\sum_{i=1}^{s} t_i}{s}$$

where s is the number of carcasses used in the scavenging trials and i denotes each carcass. Modifications to the estimator will be made if there are trial carcasses that remain at the end of the 14-day trial period (Barnard 2000; Erickson et al. 2003a; Shumway et al. 1989).

Estimation of Casualty Distribution. Since not all area within 130 ft (40 m) of the turbine is searchable on every turbine, adjustments will be made to fatality estimates by using methods similar to those used by Arnett et al. (2010) at the Casselman wind project. For this method, carcass density is modeled as a function of distance to turbine for fresh carcasses within 2-meter distance bands radiating out from the center of the turbine. Due to the irregularly shaped and likely unequally sized plots, adjustments to the mortality estimates will be made to account for unsearched areas, A, or area within 130 ft (40 m) of the turbine that was not searched and where some casualties may have fallen. A will be approximated using the following formula:

$$A = \frac{\sum_{k'=1}^{7} \frac{c_{k'}}{p_{k'} s_{k'}}}{\sum_{k'=1}^{7} \frac{c_{k'}}{p_{k'}}}$$

where $c_{k'}$ is the observed number of casualties found in the k^{th} 2-m distance band from the turbine, $p_{k'}$ is the estimated observer detection probability in the k^{th} 2-m distance band from the turbine, and $s_{k'}$ is the proportion of the k^{th} 2-m distance bands that was sampled across all turbines.

Estimation of the Total Number of Facility-related Fatalities. For equal sampling effort among turbines and assumed equal observer detection and scavenging rates among seasons, the total number of facility-related fatalities (*M*) is calculated by dividing the observed fatality rate divided by $\hat{\pi}$, an estimate of the probability a casualty is not removed and is detected and then adjusting for searchable area by multiplying by *A*:

$$M = A * \frac{N * \bar{c}}{\hat{\pi}}$$

where *N* is the total number of turbines in the wind farm. The differences between observers and scavenging rates among seasons will be tested prior to proceeding with the analysis. If significant differences exist among seasons, separate estimates by season will be calculated and added together for the overall estimate. The estimate of the probability a casualty is not removed and is detected is calculated for each vegetation visibility class. The sum of the estimates for each visibility class provides the overall estimate of facility-related mortality. The estimated mortality per turbine per year m is determined by *M/N*.

The estimate of the probability a casualty is not removed and detected, $\hat{\pi}$, is calculated by:

$$\hat{\pi} = \frac{\bar{t} \cdot p}{I} \cdot \left[\frac{\exp\left(I / \bar{t} \right) - 1}{\exp\left(I / \bar{t} \right) - 1 + p} \right]$$

where *I* is the interval between searches and p and $\bar{t}$ are as defined previously. This formula has been independently verified by Shoenfeld (2004).

The final reported estimates of *m* and associated standard errors and 90% confidence intervals will be calculated using bootstrapping techniques (Manly 1997) based on a computer program written in Program R. For each iteration of the bootstrap, the turbines, searcher efficiency trial carcasses, and the scavenger removal trial carcasses are sampled with replacement. Estimates of $\bar{c}$, $\bar{t}$, *p*, and *m* are calculated for each of 5,000 bootstrap samples. The final estimates of $\bar{c}$, $\bar{t}$, *p*, and *m*, and associated bootstrap percentile confidence intervals, are calculated from the 5,000 bootstrap estimates.

4.1.1.2 Fatality Rates Categorized by Species, Season, and Location

Fatality rates will be summarized in tabular form by species, location, and season. Mean fatality rates among species will be compared graphically or using analysis of variance (Table 4.1). Location effects on estimated fatality rates (number per turbine, number per MW, number per unit of rotor-swept-area) will be calculated by pooling fatality estimates by category and comparing means either graphically or using analysis of variance. Seasonal effects on fatality rates will be calculated by pooling fatality estimates by season and comparing means either graphically or using analysis of variance.

4.1.1.3 Fatality Rates Correlated with Wind Speed, Precipitation, Temperature, and Barometric Pressure

Data from the project met towers and/or turbines will be used to assess mortality in relation to weather variables. The wind speed, direction, temperature, precipitation, and barometric pressure data available from the project site (e.g., turbines or met tower) will be used in an analysis to correlate observed numbers of fresh fatalities (i.e., occurred the night before) from the turbines where daily searches occur with weather conditions (Table 4.1). Data from the project production (operations) monitoring will be used to assess mortality in relation to turbine operation. The turbine operation data, for example hours per night of operation, from the turbines where daily searches take place will be used in an analysis to correlate observed and adjusted numbers of fatalities with turbine operations.

Associations between turbine and weather characteristics and fresh bat casualties will be investigated using graphical methods (least squares regression lines, interaction plots), univariate association analyses (Pearson's correlations, simple linear regression), and multiple regression (Neter et al. 1996). The linear regression dependent variable will be the number of fresh bat casualties per turbine per night. Independent variables used in the analyses will be quantified from data gathered at the anemometers located on turbines and the project met tower. In the event that few casualties are recorded at the Project, generalized linear models may be used, in which fatality rates would be represented by either a poisson or a negative binomial distribution. In such a case, the Vuong test will be used to determine whether the poisson or the negative binomial distribution better models the data (Vuong 1989).

Several regression models will be fit to predict the number of fresh bat casualties found at the site. The linear regression models will be of the form:

$$y = \beta_0 + \beta_1 x_1 + \ldots + \beta_p x_p + \varepsilon,$$

which related y, average number of fresh bat mortalities, to a linear function of the set of predictor variables. $x_1, \ldots, x_p$. The β_j's are the parameters that specify the nature of the relationship and ε is a random error term $\sim N(0, \sigma^2)$. If a poisson model is deemed more appropriate, the fitted Poisson models will have log link and be of the form:

$$\log(\mu) = \beta_0 + \beta_1 x_1 + \cdots + \beta_p x_p + \varepsilon$$

which relates the behavior of the natural logarithm of the mean number of fresh bat mortalities per turbine, to a linear function of the set of predictor variables $x_1, \ldots, x_p$. The β_j's are the parameters that specify the nature of the relationship and ε is a random error term. The Program R procedure will be used to fit several alternative models using least squares regression (Neter et al. 1996). Each model will contain at least two predictor variables and possibly their interaction. To investigate the overall goodness of fit of each linear model, the coefficient of multiple determination (R^2) R^2 will be calculated, which measures the proportionate reduction of total variation in fresh bat casualties associated with using the model's predictor variables (Neter et al.

1996). For inferences about each parameter in every model fit, the student's *t* statistic and alpha-value are calculated using standard statistical procedures for least squares regression models (Neter et al. 1996).

To determine the "best" model, the second order variant of Akaike's Information Criterion (AICc) will be used (Burnham and Anderson 2002). The model with the lowest AICc value within the set of models will be chosen as the best model. The AICc value for each model is calculated as:

$$AICc = n\ln(\hat{\sigma}^2) + 2K + \frac{2K(K+1)}{n-K-1},$$

where *n* is the number of observations, *ln* was the natural logarithm, *K* is the number of parameters in the model + 1 (for $\hat{\sigma}^2$), $\hat{\sigma}^2$ and $\hat{\sigma}^2$ $\hat{\sigma}^2$ is the maximum likelihood estimate of $\hat{\sigma}^2$, $\hat{\sigma}^2$ is estimated by:

$$\hat{\sigma}^2 = \frac{\sum \varepsilon_i^2}{n}.$$

4.1.1.4 Comparison of Fatality Estimates Among Years and Monitoring Regimes

Annual monitoring will be conducted simultaneously with the three years of intensive monitoring to establish a relationship between fatality estimates obtained from the two different types of monitoring (see Section 3.0 in this RMAMP; Table 4.1). Fatality estimates obtained from intensive and annual monitoring will be compared using their bootstrapped confidence limits to determine whether annual monitoring obtains results statistically equivalent to intensive monitoring. Bootstrapping is a computer simulation technique that is useful for calculating point estimates, variances, and confidence intervals for complicated test statistics. In bootstrapping, data are sampled with replacement the same number of times as there are existing observations, thus creating a new data set. Then, estimates are calculated based on this new data set. This is done many times and then standard deviation, and quantiles can be used to estimate the variability in the original data set. If the estimates are not statistically equivalent, the ratio between estimates will be determined and can be used to gauge the magnitude of overall fatality estimates based on annual monitoring results.

Annual monitoring for the life of the ITP will be used to monitor overall bat mortality (including covered species mortality) to determine if significant changes in all bat mortality are occurring, thus warranting further detailed investigation. A series of three-year rolling averages will be computed by averaging overall bat mortality estimates across three-year intervals beginning with the first three years, then years two through four, and so on. These rolling three-year averages of overall bat mortality estimates determined during annual monitoring will be compared with the three-year average of overall bat fatality estimates determined during the initial three years of the ITP (baseline monitoring period) using a 2-sample t-test with alpha level 0.10.

4.1.1.5 Annual Monitoring Searcher Efficiency and Scavenger Removal

Data obtained during spot check on annual monitoring searcher efficiency and scavenger removal will be compared with searcher efficiency and scavenger removal rates determined during the first three years of intensive monitoring, Annual searcher efficiency and scavenger removal data will be analyzed using tabular summaries, graphs, t-tests, and/or analysis of variance.

4.1.2 Research – Control vs. Treatment Tests

Research data analysis will be accomplished using industry standard methods for curtailment research and monitoring studies (e.g., Shoenfeld 2004; Arnett et al. 2010; Huso 2010). The primary metric of interest is estimated fatalities by species, by season, and by location (see Section 4.1.1 in this RMAMP). These data will be used to determine the effectiveness of various curtailment regimes through analysis of these variables for each treatment group (I and II) compared with the control group (III). Analysis of Variance (ANOVA) tests will be used to compare means between treatments and control (Table 4.1)

4.2 Reporting

BRE will provide annual reports necessary to track take levels occurring under the permit and to ensure the conservation program is being properly implemented. The following list represents the information to be provided as chapters in the monitoring reports:

1. Scientific Report, including biological goals and objectives of the HCP; objectives for the research and monitoring programs; methods; effects on the covered species or habitat and all bats; evaluation of progress toward achieving measurable biological goals and objectives; and recommendations/proposed adaptive management.
2. Facilities Report, including a summary of project activities that are covered activities, including construction, operations, maintenance, and decommissioning activities; acres disturbed; and turbine operations reports.
3. Off-site Conservation Report, including funding expenditures for off-site conservation, balance and accrual, and status and condition of off-site conservation area(s).
4. Changes Report, including a description of any minor or major amendment, changed circumstances, and actions taken.

During the term of the ITP, BRE will submit annual reports to USFWS, to be available by February 15 of each year. In addition, if BRE determines that it has exceeded annual take thresholds, BRE will promptly notify USFWS of this occurrence and will comply with the terms of the HCP regarding changed circumstances.

BRE will revise draft reports in response to USFWS comments, and BRE will produce final reports reflecting consideration of agency comments.

5.0 ADAPTIVE MANAGEMENT PLAN

5.1 Background

The primary reason for using adaptive management in HCPs is to address uncertainties in the assessment of impacts and conservation of the species covered by the HCP (USFWS 2000). An adaptive management strategy is typically incorporated into HCPs for projects that may pose a risk to the species but where scientific uncertainty remains (USFWS 2000). Under adaptive management, the mitigation activities of the HCP can be monitored and analyzed to determine if they are producing the desired results. If the desired results are not being achieved, then adjustments in the mitigation strategy will be considered through the adaptive management process defined for the HCP.

Upon issuance of the ITP, BRE will implement this RMAMP by monitoring the operating wind project with a research study embedded (see above) to test two turbine curtailment regimes for avoiding and minimizing impacts to Indiana bat and Virginia big-eared bat and at the same time reducing all bat mortality consistent with available scientific information. Any changes in agreed mitigation strategies will be designed and implemented in consultation with USFWS, subject to the limitations described in the HCP.

Under intensive and annual monitoring, if take of covered species is detected, an adjusted fatality estimate will be developed using the fatality estimator(s) described above and compared against authorized take to determine if the permitted take limit has been exceeded and/or if changed circumstances exist. If, after Year 3, significant increases (i.e., greater than the 90% confidence interval determined during baseline monitoring; see thresholds presented below) in overall bat mortality are observed when compared to the first three years, then BRE will conduct intensive monitoring in the subsequent year to determine if take of covered species may be exceeded and if changes in mitigation strategies may be warranted.

BRE estimates that up to 5.0 Indiana bats may taken on annual basis by the Project without implementation of the operational protocols contained in the HCP. BRE believes that estimated annual take of Indiana bats can be reduced to 2.5 bats per year through implementation of this RMAMP, for a total estimated take of up to 70.0 Indiana bats over the 25-year term of the ITP (5.0 x 3 years + 2.5 x 22 years = 70.0). BRE is requesting authorized take of an aggregate of 70.0 Indiana bats over the permit term, in which case BRE will not be out of compliance with the permit unless 70 Indiana bats are taken based on adjusted fatality estimates. However, given that bat mortality will undoubtedly vary during the permit term, two thresholds will trigger a meet and confer with USFWS:

1) if, in any given year, Indiana bat fatality estimates exceed 5.0 or
2) if, for three consecutive years, all bat fatality estimates exceed baseline all bat fatalities by more than the 90% confidence interval.

Through this process, BRE will intensively evaluate geographic areas of the site containing the fatalities, including seasonal and temporal presence of the fatalities, and it will develop turbine-specific operational protocols to reduce take in these areas.

The exceedence of the aggregated annual take of 70 Indiana bats over the term of the ITP will constitute an exceedence in authorized take potentially requiring permit revocation or amendment as described in the IA.

BRE estimates that up to 1.0 Virginia big-eared bat may be taken on an annual basis by the Project without implementation of operational protocols contained in the HCP. BRE believes that take of Virginia big-eared bats may be reduced to 0.5 individual per year, for a total estimated take of up to 14.0 Virginia big-eared bats over the 25-year term of the ITP (1 x 3 years + 0.5 x 22 years = 14). BRE is requesting authorized take of an aggregate of 14.0 Virginia big-eared bats over the permit term, in which case BRE will not be out of compliance with the permit unless 14 Virginia big-eared bats are taken. However, given that bat mortality will undoubtedly vary during the permit term, two thresholds will trigger a meet and confer with USFWS:

1) if, in any given year, Virginia big-eared bat fatality estimates exceed 1.0 or
2) if, for three consecutive years, all bat fatality estimates exceed baseline all bat fatalities by more than the 90% confidence interval.

Through this process, BRE will intensively evaluate geographic areas of the site containing the fatalities, including seasonal and temporal presence of the fatalities, and it will develop turbine-specific operational protocols to reduce take in these areas.

The exceedence of the aggregated annual take of 14.0 over the term of the ITP will constitute an exceedence in authorized Virginia big-eared bat take potentially requiring permit revocation or amendment as described in the IA.

5.2 Adaptive Management Process for Evaluating Operations

5.2.1 Intensive Monitoring

Monitoring results obtained during the first three years of the ITP will be used: (1) to evaluate turbine operational protocols that are expected to avoid and minimize take of Indiana bat and Virginia big-eared bat at the project and (2) to develop cost-effective operational protocols that reduce take of all bats relative to baseline levels consistent with available scientific information. Examples of different turbine operational protocols include changes in the turbine cut-in speed; changes in timing of turbine operating regimes (if timing of Indiana or Virginia big-eared bat fatalities suggests a specific period when these species are at greatest risk); selected turbine curtailment (if evidence indicates specific turbines are causing significantly greater mortality of bats); and deployment and testing of bat deterrent technology if suitable technology is available.

If, as a result of the turbine cut-in speed adjustments, the actual amount of take is estimated to be at or below 2.5 Indiana bats and 0.5 Virginia big-eared bat at the end of Year 1 of the ITP and BRE has developed successful operational protocols to reduce the overall bat mortality at the Project by 50% or more relative to baseline levels, then operational protocols established by BRE through research and monitoring in Year 1 of the ITP will continue for a second year to verify their effectiveness. Thereafter, if established operational protocols established remain effective during Years 2 and 3 of the ITP, then those protocols will remain in place for the term of the ITP except as either modified below or as modified with the agreement of both USFWS and BRE. In no case will such modified operational protocols result in less protection for covered species than those set forth in Section 5.0 of the HCP (i.e., if BRE's Curtailment Plan successfully reduces bat mortality to levels that exceed expectations, BRE agrees to maintain the 10.7 mph (4.8 m/s) cut-in speed and partial-night curtailment for the duration of the ITP).

> **EXAMPLE**: If BRE adjusts the cut-in speed of turbine to 4.8 m/s and feathers the turbine blades below the 4.8 m/s cut-in speed during the period from ½ hour before sunrise to 5 hours after sunrise and from July 22 to October 13 (a 12-week period). Results of the monitoring studies suggest that for the turbines with these operational constraints, Indiana bat mortality is 1.2 individuals per year and overall bat mortality is 65% less than normally operating turbines. BRE will repeat the monitoring and study of these turbine adjustments for years 2 and 3. Provided the results remain the same, BRE will operate the entire project with these turbine adjustments for years 4-20.

In the event that the amount of take (adjusted fatalities) exceeds 2.5 Indiana bats or 0.5 Virginia big-eared bat at the end of Years 1 or 2 of the ITP or the overall bat mortality has not been reduced by 50% relative to baseline levels, then information gained from research will be used to develop new or adjusted turbine operational protocols in Years 2 or 3 of the ITP to achieve biological goals and objectives. Such new or adjusted turbine operational protocols be the same as or will exceed BRE's Curtailment Plan.

> **EXAMPLE**: If BRE adjusts the cut-in speed of turbines to 4.8 m/s and feathers the turbine blades below the 4.8 m/s cut-in speed during the period from ½ hour before sunrise to 5 hours after sunrise and from July 22 to October 13 (a 12-week period). Results of the monitoring studies suggest that for the turbines with these operational constraints, Indiana bat mortality is 2.8 individuals per year and overall bat mortality is 40% less than normally operating turbines. BRE will evaluate the results of the monitoring studies in detail and develop, in consultation with the USFWS, modifications to the turbine operational adjustments such as extending the period of curtailment to July 15 to October 15 (a 13.5-week period) and conduct monitoring year 2 to study these new turbine operational constraints. Results of the year 2 monitoring studies then show that estimated annual Indiana bat mortality is reduced to 2.0 individuals and overall bat mortality is 55% less than normally operating turbines. BRE will implement and monitor this same modified turbine operational plan (13.5 week period) for year 3. Provided the results remain the same, BRE will operate the entire project with these new turbine adjustments (13.5 week period) for years 4-20.

In the event that at the end of Year 3 of the ITP the 3-year average take of Indiana bats exceeds 2.5 or Virginia big-eared bats exceeds 0.5 or the overall bat mortality has not been reduced by 50% relative to baseline levels, then BRE will, in consultation with USFWS, either conduct an additional year of intensive research and monitoring as described in Section 3.2.3 in this RMAMP to further reduce estimated take, or BRE will commence implementing additional operational protocols in consultation with USFWS that will result in achieving biological goals and objectives. If in subsequent years, take of Indiana bats and Virginia big-eared bats at the Project remains below 2.5 and 0.5 per year, respectively, for a period of three consecutive years and other biological goals and objectives are attained, then BRE may implement other turbine operations that achieve the same performance level in terms of reduction in mean bat mortality that was achieved the previous three years, but in no event will turbine operations be less restrictive than the 10.7 mph (4.8 m/s) cut-in speed and partial-night curtailment for the duration of the ITP. The meet and confer triggers described above would ensure that if greater turbine operations are allowed, the aggregate take limit would not be exceeded. Performance level will be measured as the mean reduction in bat mortality. Statistical similarity of mean reduction in bat mortality will be determined through comparison of 95% confidence intervals. Overlapping confidence intervals suggest that the mean reductions in bat mortality are the same and not significantly different.

EXAMPLE: If at the end of the three years of research and monitoring, BRE has determined that raising the cut-in speed of the turbines to 5.2 m/sec and feathering blades below the 5.2 m/s for the period from ½ hour before sunset to 5 hours after sunset from July 22 to October 13 (a 12-week period) has achieved the biological goals and objectives of annual Indiana bat mortality being less than less than 2.5 individuals and all bat mortality being less than 50% of all bat mortality from normally operating turbines. At the discretion of BRE, they may monitor these new turbine operational constraints for three additional years, and provided the biological goals and objectives continue to be met for the three years, BRE may adjusts turbine operational constraints in a manner to allow greater turbine operations that achieve the same performance level in terms of mean reduction in bat mortality from the previous three years but never less than a turbine cut-in speed of 4.8 m/s with blades feathered below the 4.8 m/s cut-in speed during the period from ½ hour before sunrise to 5 hours after sunrise and for a 12-week period from mid-July to mid-October. BRE would then monitor the changed operational constraints for one additional year to verify that the biological goals and objectives continue to be met and operate the project for years 7-20 according to the new turbine adjustments.

5.2.2 Annual Monitoring

If no significant changes in overall bat mortality (adjusted fatalities) are observed during annual monitoring and biological goals and objectives of the HCP are being achieved, then turbine operational protocols established by BRE as described above will remain unchanged for the term of the ITP. However, if significant changes in overall bat mortality are observed as described above, then BRE will either conduct an additional year of monitoring and evaluation, or BRE will commence implementing additional operational protocols in consultation with USFWS that will reduce overall bat fatalities.

5.2.3 Consultation Process

BRE will implement this RMAMP in consultation with USFWS. BRE will convene an annual meeting with USFWS on or about February 15 of each year to discuss monitoring results. Additional meetings may be called by BRE or USFWS to address new information that may arise prior to the annual meetings.

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APPENDIX D

BAT SPECIES OCCURRING IN WEST VIRGINIA AND BIOLOGICAL/ECOLOGICAL CHARACTERISTICS

Appendix D

Bat Species Occurring in West Virginia and Biological/Ecological Characteristics

Species	Habitat	Behavior/Ecology
Hoary bat (*Lasiurus cinereus*)	Roosts in foliage of trees; forests borders, woodlots, orchards.	Solitary, long distance migrant; winters in subtropical and tropical areas; summers throughout North America; often forages above tree top levels, along watercourses, and in urban treed areas
Red bat (*Lasiurus borealis*)	Roosts in foliage of deciduous and evergreen trees; will occupy habitats that are sparsely to moderately populated by humans	Solitary, long distance migrant; found east of the Rocky Mountains; migrates to warmer areas during the winter; forages around forest edges, clearings, or rural/urban areas
Silver-haired bat (*Lasionycteris noctivagans*)	Forested areas; generally associated with coniferous or mixed coniferous and deciduous forest types especially in areas of old growth forest	Mostly solitary; segregated by sex during the summer; migrates to southern parts of their range during the winter; forages above tree top level, along roadways or water courses; switches roosts throughout the maternity season
Tri-colored bat (*Perimyotis subflavus*)	Eastern deciduous forests; roosts in foliage or in high tree cavities and crevices; prefer edge habitats near areas of mixed agricultural use	Likely forages in wooded areas or along edge habitat; typically has strong winter roost site fidelity and long hibernations; hibernation sites include deep caves or mines; prefers to forage in edge habitats near agriculture
Little brown bat (*Myotis lucifugus*)	Primarily forested areas near water; often associated with humans; roosts under exfoliating bark, in buildings, and under rocks; hibernates in caves and mines	Generally considered a regional migrant; generally does not migrate long distances to hibernacula; hibernates communally in clusters; forages over trees, along forest edges, riparian areas, and over water where their diet consists mainly of insects with aquatic larval stages; maternity colonies located in upland trees and buildings; switches roosts throughout the maternity season
Northern long-eared bat (*Myotis septentrionalis*)	Associated with boreal forests and forests in Appalachian Mountains; roosts in buildings, under loose bark, and in cavities of trees; hibernate in caves and underground mines	Somewhat solitary but forms maternity colonies in summer; generally considered a regional migrant; does not migrate long distances; forages over small ponds, forest clearings, and forest edges; may glean insects from foliage
Indiana bat (*Myotis sodalis*)	Winter found in cavernous limestone regions of midwestern, southern, eastern, and northeastern U.S.; roosts under exfoliating bark and occasionally in buildings; hibernates in caves and mines	Generally considered a regional migrant; hibernates in dense clusters; forages near the canopy of upland forests, along forest edge, riparian areas, and over rivers or streams; maternity colonies usually located in upland trees; switches roosts throughout the maternity season

Species	Habitat	Behavior/Ecology
Eastern small-footed bat (*Myotis leibii*)	Occurs in mountainous hemlock forest regions at elevations ranging from 790-3,690 ft (240-1,125 m); eastern deciduous and coniferous forests; roosts in rock bluffs, talus, and on the ground under rocks; hibernates in caves and mines	Generally solitary but forms small maternity colonies in summer; May be considered sedentary or regional migrant; usually hibernates near the summer ranges; hibernates late in the fall; forages over water and land
Evening bat (*Nycticeius humeralis*)	Forested Areas; roosts in hollow trees, behind loose bark, or in buildings; prefers open habitats such as river corridors and wetlands	Social species; migratory between summer and winter range; remains active throughout the winter; usually never found in caves; abundant throughout the southeastern U.S.
Big brown bat (*Eptesicus fuscus*)	Variable habitats; most habitats but is most abundant in deciduous forest areas; also abundant in suburban areas; mixed agricultural; roosts beneath loose bark, in tree cavities, and buildings	Varies from solitary or in small groups to large maternity colonies; generalists in foraging behavior and habitat selections; often found in rural or urban developed areas
Virginia big-eared bat (*Corynorhinus townsendii virginianus*)	Found typically in limestone caves and regions dominated be mature hardwood forests	Solitary or in small groups; non migratory; forages over fields and woods

APPENDIX E

WIND PROJECTS WITHIN THE EASTERN U.S. AND INDIANA BAT RANGE WITH PUBLICLY AVAILABLE POST-CONSTRUCTION MONITORING RESULTS

Appendix E

Wind Projects in the Eastern U.S. Within Indiana Bat Range with Publicly Available Post-Construction Monitoring Results.

Project	Location	Approximate Distance to Beech Ridge	Ecoregion/Habitat/ Topography[1]	Project Size/ Turbines	Monitoring Study(s)	References[2]
Mountaineer	Tucker County, WV	100 miles (161 km)	Appalachian Mountains; Appalachian Plateau; Central Appalachian Broadleaf Forest; oak-hickory, maple-beech-birch; ~3,000-3,600 ft (914-1,097 m)	44 Neg Micon 72C turbines, 1.5 MW, 228-ft (69.5-m) towers, rotor diameter 236-ft (72-m), rotor-swept area 110-346 ft (33.5-105 m) agl.	2003 – 33 week study Apr –Nov standardized carcass searches; 10-day search interval, 44 turbines; searcher efficiency trials; carcass removal trials 2004 – 6 week fall study Aug-Sep standardized carcass searches; 1-day search interval, 44 turbines; searcher efficiency trials; carcass removal trials; search area adjustments	Kerns and Kerlinger 2004 Arnett et al. 2005
Mount Storm	Grant Count, WV	100 miles (161 km)	Appalachian Mountains; Appalachian Plateau; Central Appalachian Broadleaf Forest; oak-hickory, maple-beech-birch, industrial; 2,600-3,800 ft (792-1,158 m)	132 Gamesa G-80 turbines, 2.0 MW, 256-ft (78-m) towers, rotor diameter 264 ft (80 m), rotor-swept area 125-387 ft (38-118 m) agl.	2008 – 12 week fall study Jul-Oct 2009 - 12 week spring study Mar-Jun 2009 – 12 week fall study Jul-Oct standardized carcass searches; 1-day search interval 15 turbines, 7-day search interval 28 turbines; searcher efficiency trials; carcass removal trials; search area adjustments	Young et al. 2009a, 2009b, 2010a
Myersdale	Somerset County, PA	150 miles (241 km)	Appalachian Mountains; Appalachian Plateau; Central Appalachian Broadleaf Forest; oak-hickory; 2,600-2,900 ft (792-884 m)	20 Neg Micon 72C turbines, 1.5 MW, 262-ft (80 m) towers, rotor diameter 326 ft (72 m), rotor-swept area 144-380 ft (44-116 m) agl.	2004 – 6 week fall study Aug-Sep; standardized carcass searches, 1-day search interval; searcher efficiency trials; carcass removal trials; search area adjustments	Arnett et al. 2005
Casselman	Somerset County, PA	155 miles (249 km)	Appalachian Mountains; Appalachian Plateau; Central Appalachian Broadleaf Forest; oak-hickory; 2,000-3,000 ft (610-914 m)	23 1.5 GE Turbines 1.5 MW, 262-ft (80-m towers, rotor diameter 252 ft (77 m), rotor-swept area 136-389 ft (41.5-118 m) agl.	2008 – 30 week study Apr-Nov; standardized carcass searches, 1-day search interval; searcher efficiency trials; carcass removal trials; search area adjustments	Arnett et al. 2009a

Project	Location	Approximate Distance to Beech Ridge	Ecoregion/Habitat/ Topography[1]	Project Size/ Turbines	Monitoring Study(s)	References[2]
Buffalo Mtn	Anderson County, TN	225 miles (362 km)	Appalachian Mountains; Cumberland Plateau; Central Appalachian Broadleaf Forest; oak-hickory, oak-pine, industrial; 3,300 ft (1,006 m)	3 Vestas V47 turbines, 660 kW, 213-ft (65-m) towers, rotor diameter 154 ft (47 m), rotor-swept area 136-290 ft (41.5-88 m) agl. 18 Vestas V80 turbines, 1.8 MW, 256-ft (78-m) towers, rotor diameter 278 ft (84 m), rotor-swept area 118-392 ft (36-120 m) agl.	2000-2003 – 30 week study Apr-Nov each year; ~3.5 day (twice weekly) search interval; searcher efficiency trials; carcass removal trials; search area adjustments; background mortality adjustments 2005 – 36 week study Apr-Dec; variable search interval, 2-7 days; searcher efficiency trials; carcass removal trials; search area adjustments	Fiedler 2004 Fiedler et al. 2007
Maple Ridge	Lewis County, NY	300 miles (482 km)	Appalachian Mountains; Northeast Highlands; East Adirondack Foothills; Mixed broadleaf –white pine forest; 2,200 ft (671 m)	195 Vestas V82 turbines, 1.65 MW, 262-ft (80-m) towers, rotor diameter 269 f5 (82 m), rotor-swept area 128-396 ft (39-121 m) agl.	2006-2007; variable study periods by year; no winter surveys; variable search intervals from 1-day to 7-day; searcher efficiency trials; carcass removal trials	Jain et al. 2007, 2009

1 USFWS 2007; Bailey 1997; Woods et al. 2007
2 References listed in the Beech Ridge Wind Energy Habitat Conservation Plan

APPENDIX F

IMPLEMENTING AGREEMENT

IMPLEMENTING AGREEMENT

by and between

BEECH RIDGE ENERGY LLC

and the

U.S. FISH AND WILDLIFE SERVICE

This IMPLEMENTING AGREEMENT ("IA"), which implements the Beech Ridge Wind Energy Project Habitat Conservation Plan ("Plan"), is entered into as of the date of last signature below by the UNITED STATES FISH AND WILDLIFE SERVICE, an agency of the Department of the Interior of the United States of America ("USFWS"), and BEECH RIDGE ENERGY LLC ("BRE"), hereinafter collectively called the "Parties" and individually, a "Party."

1.0 <u>RECITALS</u>

The Parties have entered into this IA in consideration of the following facts:

1.1 The USFWS has jurisdiction over the conservation, protection, restoration, enhancement and management of fish, wildlife, native plants and their habitats under various federal laws, including the Endangered Species Act ("ESA") (16 U.S.C. § 1531 *et seq*.), the Migratory Bird Treaty Act ("MBTA") (16 U.S.C. § 701 *et seq*.), the Bald and Golden Eagle Protection Act ("BGEPA") (16 U.S.C. § 668 et seq.), the Fish and Wildlife Coordination Act (16 U.S.C. §§ 661-666(c)), and the Fish and Wildlife Act of 1956 (16 U.S.C. § 742(a) *et seq*.).

1.2 The ESA prohibits the "take" of species listed as endangered or threatened under the ESA. Under Section 10(a)(1)(B) of the ESA (16 U.S.C. § 1539(a)(1)(B)), the USFWS may issue permits authorizing the incidental take of endangered or threatened species during otherwise lawful activities if certain statutory requirements are met by the applicant and such take will not appreciably reduce the likelihood of the survival and recovery of the species in the wild. To obtain a federal incidental take permit ("ITP"), the applicant must submit a habitat conservation plan describing, among other things, the steps the applicant will take to minimize and mitigate the maximum extent practicable the impact of such take. BRE submitted its application for an ITP to the USFWS on June 30, 2011, and amended the application in response to comments from the USFWS on August 31, 2011;

1.3 BRE owns and operates the Beech Ridge Wind Energy Project ("the Project"), located in Greenbrier County and Nicholas County, West Virginia, as more fully described in Exhibit A. BRE will operate the Project pursuant to a siting certificate issued by the State of West Virginia.

1.4 BRE leases the Covered Lands upon which the Project is located. BRE has acquired the necessary legal rights to construct and operate the Project and its associated facilities from the underlying land owners;

1.5 BRE, with technical assistance from the USFWS, has prepared a Habitat Conservation Plan ("Plan") and related documents covering certain listed "Covered Species" under the jurisdiction of USFWS (as further defined below);

1.6 BRE has developed a series of conservation measures to conserve listed species and to meet other applicable requirements of the ESA to support issuance of ITP by USFWS pursuant to Section 10(a)(l)(B) of the ESA for the permit term described in Section 6.0 herein;

1.7 BRE has developed the Plan, which is designed to substantively address effects to Covered Species and benefit their local and regional populations; the Plan causes BRE to, among other things, (a) engage in certain habitat enhancement actions for certain Covered Species; (b) adjust Project operations consistent with the siting certificate to implement certain conservation actions; and (c) provide information on the implementation of these conservation actions;

1.8 The IA defines the Parties' roles and responsibilities and provides a common understanding of actions that will be undertaken under the Plan and ITP, among other things, to minimize and mitigate the take of Covered Species (described in Section 1.5 of the Plan) from Covered Activities (described in Section 2 of the Plan) within the Covered Lands (described in Section 1.4 of the Plan); and

1.9 Adequate consideration supports this Agreement. BRE is agreeing to substantial commitments of financial resources, human resources, and other assets to conserve and manage the Covered Species and their habitats in accordance with the Plan and ITP, in exchange for the assurances provided by the USFWS in the ITP and this Agreement.

THEREFORE, the Parties hereto hereby agree as follows:

2.0 TERMS USED

Terms defined and used in this IA shall have the same meaning as those terms are defined in the Plan, the ESA, and USFWS' implementing regulations, except where specifically noted in Section 3.0. herein.

3.0 DEFINITIONS

The following terms shall have the following meanings for all purposes of this IA:

2.1 "IA" means this Implementing Agreement as the same may be amended from time to time.

2.1 "Covered Activities" means those activities specified in Section 2 of the Plan for which incidental take coverage under the ESA is authorized in the ITP.

2.2 "Covered Lands" means the geographic area described in Section 1.4 of the Plan in which Covered Activities will occur and is synonymous with the property as described on Exhibit A to the Plan, as it may be modified from time to time in accordance with the terms hereof.

2.3 "Covered Species" means Indiana bat (*Myotis sodalis*) and Virginia big-eared bat (*Corynorhinus townsendii virginianus*); the list of covered species may be modified from time to time in accordance with the terms of Section 1.5 of the Plan, the USFWS' implementing regulations and this IA.

2.4 "ESA" means the Endangered Species Act, 16 U.S.C. §§ 1531 *et seq*., as the same may be amended or reauthorized from time to time and any successor statute or statutes.

2.5 "ITP" means the incidental take permit to be issued by the USFWS to BRE as provided in this IA as the same may be amended or assigned from time to time in accordance with the terms hereof.

2.6 "Plan" means the certain Habitat Conservation Plan prepared by BRE, described above in Section 1.5.

2.7 "Project" means the Beech Ridge Wind Energy Project.

4.0 RELATIONSHIP BETWEEN THE PLAN AND THE IA

The Plan and each of its provisions are intended to be, and by this reference are, incorporated herein. In the event of any direct contradiction between the terms of this IA and the Plan, the terms of this IA will control only for the purposes of interpreting this IA. The provisions of the Plan, ITP, and this IA shall be interpreted to be consistent with and complementary to each other. This IA is not intended to negate or nullify any provision of the ITP and/or the Plan.

5.0 PURPOSES

The purposes of this IA are:

5.1 To ensure implementation of the terms of the Plan and ITP;

5.2 To describe remedies and recourse should any Party fail to perform its obligations, responsibilities, and tasks as set forth in the Plan, ITP and IA; and

5.3 Provide assurances to BRE in the case of changed or unforeseen circumstances that, as long as the terms of the Plan and the ITP issued pursuant to the Plan and this IA are fully and faithfully performed, no additional mitigation will be required with respect to Covered Species except as provided for in the Plan, ITP, this IA, or as otherwise required by law (see 50 C.F.R. § 17.22(b)(5).

6.0 TERM

6.1 Initial ITP Term. This IA shall become operative on the effective date. The ITP shall become effective on the date indicated on the ITP. The term of the ITP is twenty-five (25) years except as indicated herein, consistent with Section 1.3 of the Plan.

6.2 Permit Renewal. Upon agreement of the Parties and compliance with all applicable laws, the ITP may be renewed to extend beyond its initial term in accordance with

USFWS regulations in force on the date of BRE's submission of its application for renewal and, to the extent applicable, in accordance with Section 8.4 of the Plan (Amendment Process). If BRE desires to renew the ITP, it will so notify USFWS at least one-hundred eighty (180) days before the expiration date of the ITP. BRE shall be required, however, to submit a written application for renewal to the USFWS within the time period set forth in the USFWS' regulations then in force. Renewal of the ITP shall constitute an extension of the Plan, and this IA may be amended and renewed for the same period of time as the amended and renewed ITP.

7.0 FUNDING

7.1 In General. BRE warrants that it has, and shall expend, such funds as may be necessary to fulfill its obligations under the ITP, the Plan, and this IA. BRE shall promptly notify USFWS of any material change in BRE's financial ability to fulfill its obligations under the Plan, ITP, and this IA.

7.2 Financial Assurance for Monitoring. To ensure full performance of the monitoring obligations contained in Section 5 of the Plan and the financial assurance obligations contained in Section 6.0 of the Plan, BRE shall post a Letter of Credit or equivalent financial security in a form substantially similar to Exhibit A to this IA. BRE shall maintain the Letter of Credit for the term of the ITP as described in Section 6.0 of the Plan.

7.3 Financial Assurance for Off-site Mitigation. BRE shall ensure full performance of off-site mitigation obligations in accordance with Section 5.3 and 6.0 of the Plan. BRE shall, within ninety (90) days of issuance of the ITP, deposit $785,500 into a segregated conservation fund administered by a third party selected by BRE and USFWS. USFWS shall approve any release of money from the conservation fund for appropriate conservation projects that meet the biological goals, objectives and criteria of the Plan.

(a) Expenditure of Money from Conservation Fund. In the event of a legal challenge to the final ITP by any third party, expenditures of money from the mitigation fund will be stayed until the final resolution of such legal challenges, including any administrative or judicial appeals by any party. Upon exhaustion of appeals to such challenges, money in the conservation fund may be spent and obligated so long as the permit is not terminated, relinquished, or revoked.

(b) Refund of Unspent and Unobligated Money from the Conservation Fund. In the event the ITP is terminated, relinquished, or revoked in accordance with the terms of this IA prior to the expenditure of all money from the conservation fund, then the balance of all unspent and unobligated money shall promptly be refunded to BRE in accordance with Section 13 of this IA. Upon such an event, BRE will notify both the third party fund administrator and USFWS, and the third party fund administrator shall promptly refund all unspent and unobligated money to BRE.

8.0 RESPONSIBILITIES OF THE PARTIES

8.1 BRE's Responsibilities. In consideration of the issuance of an ITP authorizing any incidental take which may result from activities conducted in accordance with the Plan, and in consideration of the assurances provided by the ITP, the USFWS regulations and IA, BRE agrees to:

(a) Fully and faithfully perform all obligations in the Plan, the ITP and this IA, including, but not limited to, all the conservation management and monitoring measures, as well as those measures deemed necessary for Adaptive Management or to respond Changed Circumstances as identified through processes described in the Plan.

(b) Fully fund all costs needed to perform its affirmative obligations under the ITP and the Plan.

(c) Promptly notify USFWS if, for any reason (including, but not limited to, court rulings or lack of sufficient funds), BRE has or is likely to become unable to fulfill any obligation required by the Plan, the ITP or IA.

(d) Promptly respond to all notices from USFWS in accordance with the Plan, ITP or IA, and inquiries from USFWS regarding the same.

(e) Promptly notify USFWS of any lawsuits filed against BRE or written notices or letters expressing intent to file suit challenging the issuance of or compliance with the ITP.

(f) Notify USFWS in writing within ten (10) days of the occurrence of any of the following: (1) any change in the registered name of BRE; (2) the dissolution of BRE; (3) the sale or conveyance of BRE; (4) bankruptcy proceedings by BRE as well as whether BRE is in receivership; (5) when BRE will no longer perform the Covered Activities in the Covered Lands; (6) the revocation or suspension of BRE's corporate authorization to do business in the state or states in which it is registered to do business and, (7) BRE is disqualified from performing Covered Activities under the ITP for either of the disqualifying factors circumstances listed in 50 C.F.R. § 13.21(c) and (d), as may be amended, or under any future USFWS regulation.

8.2 USFWS' Responsibilities. USFWS agrees pursuant to its authorities to:

(a) Fully and faithfully perform all obligations required under this IA, the Plan and ITP; in particular, upon execution of the IA, and satisfaction of all other applicable legal requirements, issue an ITP to BRE authorizing specified incidental take of Covered Species which may result from activities conducted in accordance with the Plan. The ITP will include the no surprises assurances set forth in 50 C.F.R. § 17.22(b)(5) and articulated in the Plan at Section 8.

(b) As of the effective date of the ITP, and provided there are no conditions in the ITP that must be satisfied prior to BRE engaging in an authorized take, BRE may take the Covered Species while carrying out Covered Activities in the Covered Lands, as authorized by and subject to the conditions of the ITP and the Plan.

(c) Cooperate with and provide technical assistance to BRE as well as attend meetings requested by BRE to consider matters relevant to the Project, the Plan, and the ITP, or any of the operations or other activities contemplated there-under; promptly respond to all notices received from BRE in accordance with the Plan, ITP and IA.

(d) Promptly notify BRE if, for any reason (court ruling or lack of appropriated funds), USFWS is unable to fulfill any obligation associated with the Plan, ITP or this IA.

(e) Promptly notify BRE of any lawsuits filed against USFWS, requests for disclosures of documents received under the Freedom of Information Act pertaining to the ITP, or written notices or letters expressing an intent to file suit against USFWS challenging the issuance of, or BRE's compliance with, the ITP or any federal law relating to the ITP.

9.0 CHANGED CIRCUMSTANCES AND ADAPTIVE MANAGEMENT

9.1 Changed Circumstances and Adaptive Management Provided for in the Plan. Section 8.2 of the Plan contains the complete list of Changed Circumstances and describes those specific conservation and mitigation measures that BRE agrees to implement where, pursuant to the Plan, they are deemed necessary to respond to the Changed Circumstances. The RMAMP, which is part of the Plan, contains the adaptive management strategy to respond to new information produced by required monitoring. Any revisions or amendments to the Plan or ITP will be determined on a case-by-case basis, and undertaken in accordance with Amendment Process in Section 8.4 of the Plan, and referenced in Section 16 of this IA.

9.2 Changed Circumstances Not Provided for in the Plan. If additional conservation and mitigation measures beyond those provided for in the Plan are deemed necessary to respond to Changed Circumstances, USFWS may not require any such additional conservation and mitigation measures without BRE's consent, provided that the Plan is being properly implemented.

9.3 Compliance with Changed Circumstances. Take of Covered Species occurring during the implementation of conservation and mitigation pursuant to Changed Circumstances provided under the Plan shall be covered take under the ITP so long as BRE remains in compliance with the provisions of the Plan and the ITP. USFWS reserves the right under 50 CFR § 17.22(b)(8) to revoke the permit in the event the permitted activity would be inconsistent with the criterion set forth in 16 U.S.C. § 1539(a)(2)(B)(iv) and the inconsistency has not been remedied in a timely fashion.

10.0 REPORTING, INSPECTIONS AND MONITORING

10.1 Reporting. BRE will provide USFWS with the reports described in Section 5.2 of the Plan and Appendix C of the Plan at the notice address then in effect for USFWS, and will provide any available information reasonably requested by USFWS to verify the information contained in such reports. BRE will provide USFWS, within thirty (30) calendar days, any additional information requested to determine whether BRE is in compliance with the ITP, Plan and IA.

10.2 Certification of Reports. All reports shall include the following certification by a responsible company official who supervised or directed preparation of the report:

> Under penalty of law, I certify that, to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of this report, the information submitted is true, accurate, and complete.

10.3 Inspections. USFWS may inspect the Covered Lands in accordance with its applicable regulations and law. Except where USFWS has reason to believe that BRE may be acting in violation of applicable laws or regulations or in breach of the ITP or this IA, USFWS will provide reasonable advance notice of its inspection and will allow BRE's representatives to accompany USFWS' representatives making such inspection. USFWS shall ensure that any individual conducting an inspection of the Project on its behalf performs such inspection in compliance with all regulations and statutes applicable to USFWS, and the requirement of this section for advance notice, where applicable. Any representative of USFWS inspecting the Project shall use reasonable efforts to promptly brief BRE on the information learned during any such inspection. For the purpose of this paragraph, USFWS is intended to mean agency employees, contractors and law enforcement agents.

10.4 Annual Meetings. BRE and USFWS shall conduct annual meetings during the month of March following the Effective Date to discuss Plan implementation and selection of habitat enhancement projects under 5.3 of the Plan. Nothing in the ITP, Plan or this IA shall prevent the Parties from meeting more frequently.

11.0 LAND TRANSACTIONS

11.1 In General. Nothing in this IA, the ITP, or the Plan shall limit BRE's rights to acquire any interest in additional lands in and around the Project or elsewhere. Nothing in this IA, the ITP or the Plan shall require BRE to include in the Project or to add to the ITP's Covered Lands any additional lands it may acquire. Unless such lands are added to the Project in the manner provided below, however, any such lands as may be acquired by purchase, exchange or otherwise will not be Covered Lands. If the USFWS approves ITP and Plan amendments, any newly acquired lands, shall thereafter constitute a portion of the Project and all references to the Project shall be deemed to include a reference to such acquired lands.

11.2 Inclusion of Additional Property as Covered Lands. If BRE acquires any additional mitigation lands, BRE may elect to include such lands in the ITP in accordance with the amendment process contained in Section 8.4 of the Plan and Section 16 of this IA. Upon such election, BRE shall provide notice to the USFWS of its desire to include additional lands, along with a specific description of the location, legal description, and conditions of such additional property.

11.3 Removal of Property from Covered Lands. BRE may not sell any lands included in Covered Lands, or exchange any portion thereof with, to any new party during the term of this IA unless (a) the ITP and Plan are modified to delete such lands; or (b) the lands are transferred to a third party who has agreed to be bound by the terms of the Plan. In responding to any request to remove lands from Covered Lands, the USFWS shall consent to such proposed removal unless it finds that the proposed removal of land would materially compromise the effectiveness of the Plan. In such a case, the USFWS shall notify BRE in writing of this determination, and the Parties shall promptly meet to discuss potential modifications to the ITP or Plan to address the USFWS' concerns. If BRE sells or exchanges any of the Covered Lands, upon sale or exchange such lands shall not be deemed a portion of the Covered Lands.

12.0 SUSPENSION OF THE ITP

12.1 In General. In accordance with the process contained in applicable regulations, USFWS may suspend the ITP for any material violation by BRE of the ITP, the Plan, or this IA, or any other basis for suspension expressly provided for in a USFWS regulation. The USFWS permit suspension regulation is currently 50 C.F.R. § 13.27. The procedures for requesting reconsideration of the USFWS' decision to suspend an ITP are currently 50 C.F.R. § 13.29.

12.2 Process for Suspension. The ITP may be suspended in whole or in part, i.e., only to Covered Species, portions of the Covered Lands, or certain Covered Activities. In deciding whether to suspend the ITP, USFWS shall apply the governing regulatory requirements. Such suspension shall remain in effect until the USFWS determines that BRE has corrected the deficiencies. The USFWS agrees to act expeditiously in making such determinations.

When USFWS finds that there are valid grounds for suspending the ITP, it shall notify BRE in writing of the proposed suspension by certified or registered mail. The notice, which may be amended by USFWS at any time, will identify the ITP; the reason(s) for the suspension; if a partial suspension, the Covered Activities and Covered Species as to which the suspension applies; and the actions necessary to correct the deficiencies and will inform BRE of its right to object to the proposed suspension pursuant to regulation. Upon receipt of the proposed notice, BRE may file a written objection to the proposed action within forty-five (45) calendar days of the date of the receipt of the notice providing BRE's reasons for objecting to the proposed suspension as well as any supporting documentation. USFWS will issue a written decision on the suspension within forty-five (45) calendar days after the end of the objection period, which will include its decision and its reasons for such as well as information concerning BRE's right to request reconsideration of the decision and the procedures for doing so.

Upon notification that the ITP has been suspended and after all appeal procedures and periods have been exhausted, BRE may be required to surrender the ITP to USFWS. Notwithstanding suspension, BRE shall remain obligated for any outstanding minimization and mitigation measures required under the terms of the ITP for take that occurs prior to surrender of the ITP and other such continued monitoring explicitly required by the Plan or the ITP.

13.0 RIGHTS TO TERMINATE, RELINQUISH, AND REVOKE THE ITP

13.1 Rights of BRE to Terminate the ITP. BRE reserves the right to relinquish the ITP prior to expiration by providing thirty (30) days advance written notice to the USFWS as provided by 50 C.F.R. § 13.24, or whatever successor regulations exist at the time BRE elects to terminate. BRE may surrender the ITP by returning it to the USFWS along with a written statement of its intent to surrender and cancel the ITP. The ITP shall be deemed void and canceled upon receipt of the permit and notice by the USFWS. Except as provided in Section 7.0 above, no refund of any fees paid for issuance of the ITP or of any other fees or costs associated with the Covered Activities shall be made when the ITP is surrendered for cancellation for any reason prior to the expiration date stated on the face of the ITP. Except as provided in Section 7.0 above, notwithstanding any surrender of the ITP, BRE shall remain obligated for any outstanding minimization and mitigation measures required under the terms of the ITP for take that occurs prior to surrender of the ITP and such monitoring, or other measures as may be required pursuant the Plan, or the ITP. The ITP shall be deemed canceled only upon a determination by the USFWS that any outstanding monitoring, minimization and mitigation measures have been implemented. Upon surrender of the ITP, no further take shall be authorized under the terms of the surrendered ITP. Surrender of the ITP does not relieve BRE of its obligation to comply with the ESA.

13.2 Rights of USFWS to revoke the ITP. The ITP may be revoked by USFWS only in accordance with 50 C.F.R. §§ 13.28 and 17.22(c)(8). In accordance with 50 C.F.R. § 13.28, USFWS may revoke the ITP in whole or in part if BRE willfully violates any Federal or State statute or regulation, Indian tribal law or regulation, or any law or regulation of a foreign country that involves a violation of the conditions of the ITP or of the laws or regulations governing the Covered Activities. The ITP also may be revoked if BRE fails within sixty (60) days to correct deficiencies that were the cause of suspension of the ITP unless USFWS determines and notifies BRE in writing that a longer period of time is necessary to correct the deficiencies; becomes disqualified under 50 C.F.R. § 13.21(c); or a change occurs in the statute or regulation authorizing the ITP that prohibits continuation of the ITP. Pursuant to 50 C.F.R. §§17.22(b)(8) and 17.32(b)(8), the ITP also may be revoked if continuation of the Covered Activities would be inconsistent with the criterion set forth in 16 U.S.C. § 1539(a)(2)(B)(iv) and the inconsistency has not been remedied.

When USFWS believes there are valid grounds for revoking the ITP, it will notify BRE in writing of the proposed revocation by certified or registered mail. The notice, which may be amended by USFWS at any time, will identify the ITP, whether the revocation is as to part or all of the ITP, the Covered Activities and Covered Species as to which the revocation applies, the reason(s) for the revocation, the proposed disposition of the wildlife, if any. The notice also shall inform BRE of its right to object to the proposed revocation. Upon receipt of the proposed notice, BRE may file a written objection to the proposed action within forty-five (45) calendar days of the date of the notice providing its reasons for objecting to the proposed revocation as well as any supporting documentation.

USFWS will issue a written decision on the revocation within forty-five (45) days after the end of the objection period. The written decision will include USFWS' decision and its reasons for such as well as information concerning BRE’s right to request reconsideration of the decision under 50 C.F.R. § 13.29 and the procedures for doing so. Upon notification that the ITP has been revoked and after all appeal procedures have been exhausted, BRE may be required to surrender the ITP to USFWS. Notwithstanding revocation, BRE shall remain obligated for any outstanding minimization and mitigation measures required under the terms of the ITP for take that occurs prior to surrender of the ITP and such monitoring or other required by the Plan, or the ITP. The ITP shall be deemed canceled only upon a determination by USFWS that such minimization and mitigation measures have been implemented. Upon surrender of the ITP, no further take shall be authorized under the terms of the surrendered ITP.

13.3 Effect of Suspension, Termination, and Revocation. Any termination, relinquishment, or revocation of an ITP automatically terminates the Plan and this IA as between BRE and USFWS. Activities thereafter conducted on the Project will be subject to all applicable provisions of the ESA and related regulations as if the ITP had never been issued. A suspension, termination or revocation by USFWS limited to one or more species but less than all of the species then provided for in the ITP shall apply only to the affected species. The ITP and this IA shall continue in full force and effect as to all other Covered Species.

13.4 Post-Termination Mitigation. The Parties acknowledge that BRE's compliance with the ITP, the Plan and this IA will result in BRE having fully mitigated for any incidental take of any Covered Species *provided that* (a) BRE has fully funded the conservation fund in accordance with Section 7 of this IA, and money in this fund has been spent or obligated; or (b)BRE has fully funded the conservation fund in accordance with Section 7 of this IA, money in this fund remains unspent or unobligated, but no take of Covered Species has occurred as of the date of termination, relinquishment, or revocation. . In such a case, if BRE is in compliance with the terms of this IA, upon termination, relinquishment, or revocation of the ITP, BRE shall have no further obligations hereunder or under the ESA with regard to Covered Species or Covered Lands. In the event that BRE has fully funded the conservation fund in accordance with Section 7 of this IA, money in this fund remains unspent or unobligated, but take of Covered Species has occurred as of the date of termination, relinquishment, or revocation, then BRE and USFWS will meet and confer over the amount of money to be refunded to BRE, if any, on a pro rata basis based upon the amount of take that has occurred as of the date of termination, relinquishment, or revocation.

14.0 REMEDIES, ENFORCEMENT, AND DISPUTE RESOLUTION

14.1 In General. Except as set forth below, each Party shall have all remedies otherwise available (including specific performance and injunctive relief) to enforce the terms of this IA, the ITP, and the Plan.

14.2 No Monetary Damages. No Party shall be liable in damages to any other Party for any breach of this IA, any performance or failure to perform a mandatory or discretionary obligation imposed by this IA or any other cause of action arising from this IA.

14.3 Enforcement Authority of the United States. Nothing contained in this IA is intended to limit the authority of the United States government to seek civil or criminal penalties or otherwise fulfill its enforcement responsibilities under the ESA or other applicable law.

14.5 Dispute Resolution. The Parties recognize that good faith disputes concerning implementation of, or compliance with, or suspension, revocation or termination of this IA, the Plan or the ITP may arise from time to time. The Parties agree to work together in good faith to resolve such disputes, using the dispute resolution procedures set forth in this Paragraph or such other procedures upon which the Parties may later agree. However, if at any time any Party determines that circumstances so warrant, it may seek any available remedy without waiting to complete dispute resolution. If USFWS has reason to believe that BRE may have violated the ITP, the Plan or this IA with respect to any Covered Species, it will notify BRE in writing of the specific provisions which may have been violated, the reasons USFWS believes BRE may have violated them, and the remedy the USFWS proposes to impose to correct or compensate for the alleged violation. BRE will then have sixty (60) days, or such longer time as may be mutually acceptable, to respond. If any issues cannot be resolved within thirty (30) days, or such longer time as may be mutually acceptable, after BRE's response is due, the Parties will consider non-binding mediation and other alternative dispute resolution processes. The Parties reserve the right, at any time without completing informal dispute resolution, to use whatever enforcement powers and remedies are available by law or regulation, including but not limited to, in the case of the USFWS, suspension or revocation of the ITP and civil or criminal penalties.

15.0 LIMITATIONS AND EXTENT OF ENFORCEABILITY

15.1 No Surprises Assurances. Pursuant to Section 8.2(a), herein, USFWS is obligated to issue the ITP with the regulatory assurances described more fully in Section 8 of the Plan (the Federal "No Surprises" Rule, 63 Fed. Reg. 8859 (Feb. 23, 1998) (codified at 50 C.F.R. §§ 17.3, 17.22(b)(5), 17.32(b)(5)). As further detailed in the rule, so long as BRE is properly implementing the Plan, the IA, and the ITP, no additional commitment of land, water, or financial compensation will be required with respect to Covered Species, and no restrictions on the use of land, water, or other natural resources will be imposed beyond those specified in the Plan without the consent of the BRE. Application of the rule to changed circumstances is described herein at Section 9.2. With respect to unforeseen circumstances, USFWS bears the burden of demonstrating that they exist using the best available scientific and commercial data available while considering certain factors. (50 C.F.R. §§ 17.22(b)(5)(iii)(C)).

In negotiating unforeseen circumstances, the USFWS will not require the commitment of additional land, water or financial compensation or additional restrictions on the use of land, water or other natural resources beyond the level otherwise agreed upon for the species covered by the Plan without the consent of BRE. (50 C.F.R. §§ 17.22(b)(5)(iii)(A)). If additional conservation and mitigation measures are deemed necessary to respond to unforeseen circumstances, USFWS may require additional measures of BRE where the Plan is being properly implemented only if such measures are limited to modifications within conserved habitat areas, if any, or to the Plan's operating conservation program for the affected species, and maintain the original terms of the plan to the maximum extent possible. (50 C.F.R. §§ 17.22(b)(5)(iii)(B)). Additional conservation and mitigation measures will not involve the commitment of additional land, water or financial compensation or additional restrictions on the use of land, water, or other natural resources otherwise available for development or use under the original terms of the conservation plan without the consent of BRE.

Notwithstanding these assurances, nothing in the No Surprises Rule will be construed to limit or constrain the USFWS, any Federal agency, or a private entity, from taking additional actions, at its own expense, to protect or conserve a species included in a conservation plan. (50 C.F.R. §§ 17.22(b)(6)).

15.2 Property Rights and Legal Authorities Unaffected. The Parties agree that BRE has entered into the ITP, Plan and this IA on a voluntary basis. Except as otherwise specifically provided herein, nothing in this IA shall be deemed to restrict the rights of BRE to operate the Project, or use or develop Covered Lands; provided, that nothing in this IA shall absolve BRE from such other limitations as may apply to such activities, lands, or interests in land, under the ESA or other laws, of the United States, and the laws of West Virginia.

15.3 Property Rights Retained. The Parties recognize that Covered Lands and Covered Activities may provide multiple benefits beyond conservation of Covered Species, including, but not limited to, renewable energy benefits, pollution benefits, tax benefits, environmental benefits, carbon benefits, clean water benefits, and open space benefits ("Additional Benefits"). Nothing in this IA is intended to limit BRE's rights to participate in any program or enter into any agreement to recognize the full financial value of these Additional Benefits, provided that BRE complies with the ITP.

16.0 MODIFICATIONS AND AMENDMENTS

16.1 Modifications to this IA. This IA may be amended only with the written consent of each of the Parties hereto. Either Party may object to any amendment proposed by the other upon any reasonable basis.

16.2 Amendment or Modification of the Plan. The Plan may be amended or modified with the written consent of each of the Parties hereto. The USFWS also may amend the ITP at any time for just cause, and upon a written finding of necessity, during the permit term in accordance with 50 C.F.R. § 13.23(b). Either Party may object to any amendment proposed by the other upon any reasonable basis. The categories of modifications are administrative changes, minor amendments, and major amendments.

(a) Administrative Changes. Administrative changes are internal changes or corrections to the HCP that may be made by BRE, at its own initiative, or approved by BRE in response to a written request submitted by the USFWS. Requests from the USFWS shall include an explanation of the reason for the change as well as any supporting documentation. Administrative changes on BRE's initiative do not require preauthorization or concurrence from the USFWS. Administrative changes are those that will not (a) result in effects on a HCP species that are new or different than those analyzed in the HCP, EIS, or the USFWS's BO, (b) result in take beyond that authorized by the ITP, (c) negatively alter the effectiveness of the HCP, or (d) have consequences to aspects of the human environment that have not been evaluated. BRE will document each administrative change in writing and provide the USFWS with a summary of all changes, as part of its annual report, along with any replacement pages, maps, and other relevant documents for insertion in the revised document. Administrative changes include, but are not limited to, corrections of typographical, grammatical, and similar editing errors that do not change intended meanings; corrections of any maps or exhibits to correct minor errors in mapping; and corrections of any maps, tables, or appendices in the HCP to reflect approved amendments, as provided below, to the HCP, IA, or ITP.

(b) Minor Amendments. Minor amendments are changes to the HCP the effects of which on HCP species, the conservation strategy, and BRE's ability to achieve the biological goals and objectives of the HCP are either beneficial or not significantly different than those described in this HCP. Such amendments also will not increase impacts to species, their habitats, and the environment beyond those analyzed in the HCP, EIS, and the BO or increase the levels of take beyond that authorized by the ITP. Minor amendments may require an amendment to the ITP or the IA. A proposed minor amendment must be approved in writing by the USFWS and BRE before it may be implemented. A proposed minor amendment will become effective on the date of the joint written approval.

BRE or the USFWS may propose minor amendments by providing written notice to the other party. The party responding to the proposed minor amendment shall respond within thirty (30) days of receiving notice of such a proposed modification. Such notice shall satisfy the provisions of 50 C.F.R. § 13.23 as well as include a description of the proposed minor amendment; the reasons for the proposed amendment; an analysis of the environmental effects, if any, from the proposed amendment, including the effects on HCP species and an assessment of the amount of take of the species; an explanation of the reason(s) the effects of the proposed amendment conform to and are not different from those described in this HCP; and any other information required by law. When BRE proposes a minor amendment to the HCP, the USFWS may approve or disapprove such amendment, or recommend that the amendment be processed as a major amendment as provided below. The USFWS will provide BRE with a written explanation for its decision. When the USFWS proposes a minor amendment to the HCP, BRE may agree to adopt such amendment or choose not to adopt the amendment. BRE will provide the USFWS with a written explanation for its decision. The USFWS retains its authority to amend the ITP, however, consistent with 50 C.F.R. § 13.23.

Provided a proposed amendment is consistent in all respects with the criteria in the first paragraph of this section, minor amendments include, but are not limited to, the following: updates to the land cover map or to take species occurrence data; decreasing the scope of the covered lands in the HCP; minor changes to the biological goals or objectives; modification of monitoring protocols for HCP effectiveness not in response to changes in standardized monitoring protocols from the USFWS; modification of existing, or adoption of new, incidental take avoidance measures; modification of existing, or adoption of additional, minimization and mitigation measures that improve the likelihood of achieving HCP species objectives; discontinuance of implementation of conservation measures if they prove ineffective; modification of existing or adoption of new performance indicators or standards if results of monitoring and research, or new information developed by others, indicate that the initial performance indicators or standards are inappropriate measures of success of the applicable conservation measures; modification of existing or the adoption of additional habitat objectives for HCP species, where such changes are consistent with achieving HCP species and habitat goals as well as the overall goals of the HCP; minor changes to survey or monitoring protocols that are not proposed in response to adaptive management and that do not adversely affect the data gathered from those surveys; day-to-day implementation decisions, such as maintenance of erosion and sediment control devices; modifying the design of existing research or implementing new research; conducting monitoring surveys in addition to those required by the HCP and ITP; modifying HCP monitoring protocols to align with any future modifications to the protocols by the USFWS; adopting new monitoring protocols that may be promulgated by the USFWS in the future; updating construction windows for Covered Species in the event that standard construction windows established for such species are revised by the USFWS and agreed to by BRE; and minor changes to the reporting protocol.

(c) Major Amendments. A major amendment is any proposed change or modification that does not satisfy the criteria for an administrative change or minor amendment. Major amendments to the HCP and ITP are required if BRE desires, among other things, to modify the projects and activities described in the HCP such that they may affect the impact analysis or conservation strategy of the HCP, affect other environmental resources or other aspects of the human environment in a manner not already analyzed, or result in a change for which public review is required. Major amendments must comply with applicable permitting requirements, including the need to comply with NEPA, the NHPA, and Section 7 of the ESA.

In addition to the provisions of 50 C.F.R. § 13.23(b), which authorize the USFWS to amend an ITP at any time for just cause and upon a finding of necessity during the permit term, the HCP and ITP may be modified by a major amendment upon BRE's submission of a formal permit amendment application and the required application fee to the USFWS, which shall be processed in the same manner as the original permit application. Such application generally will require submittal of a revised Habitat Conservation Plan, a revised IA, and preparation of an environmental review document in accordance with NEPA. The specific document requirements for the application may vary, however, based on the substance of the amendment. For instance, if the amendment involves an action that was not addressed in the original HCP, IA, or NEPA analysis, the documents may need to be revised or new versions prepared addressing the proposed amendment. If circumstances necessitating the amendment were adequately addressed in the original documents, an amendment of the ITP might be all that would be required.

Upon submission of a complete application package, the USFWS will publish a notice of the receipt of the application in the Federal Register, initiating the NEPA and HCP public comment process. After the close of the public comment period, the USFWS may approve or deny the proposed amendment application. BRE may, in its sole discretion, reject any major amendment proposed by the USFWS. Changes that would require a major amendment to the HCP and/or ITP include, but are not limited to, revisions to the covered lands or activities that do not qualify as a minor amendment; increases in the amount of take allowed for covered activities; and a renewal or extension of the permit term beyond 25 years, where the criteria for a major amendment are otherwise met, and where such request for renewal is in accordance with 50 C.F.R. § 13.22.

(d) Treatment of Changes Resulting from Adaptive Management, or Changed Circumstances. Unless explicitly provided in Chapters 7 or 10 of this HCP, the need for and type of amendment to deal with Adaptive Management or Changed Circumstances will be determined by the USFWS, in coordination with BRE, at the time such responses are triggered.

16.3 Amendment or Modification of the ITP. The ITP may be amended in accordance with Section 8.4 of the Plan, 50 C.F.R. § 13.23, the provisions of the ITP, and all applicable legal requirements, including but not limited to the ESA, NEPA, and the USFWS's implementing regulations.

17.0 MISCELLANEOUS PROVISIONS

17.1 No Partnership. Neither this IA nor the Plan shall make or be deemed to make any Party to this IA the agent or partner of another Party.

17.2 Severability. If any provision of this IA or the Plan is found invalid or unenforceable, such provision shall be enforced to the maximum extent possible and the other provisions shall remain in effect to the extent they can be reasonably applied in the absence of such invalid or unenforceable provisions.

17.3 Successors, Assigns and Transfers. This IA and each of its covenants and conditions shall be binding on and shall inure to the benefit of the Parties and their respective successors and assigns. Assignment or other transfer of the ITP shall be governed by the federal regulations located at.

(a) Transfer of ITP by BRE. In accordance with 50 C.F.R. § 13.25, the Parties agree that the ITP may be transferred in whole or in part to a new party through a joint submission by BRE and the new party to the USFWS field office responsible for administering the ITP describing (1) each party's role and responsibility in implementing the Plan; (2) each party's role in funding the implementation of the Plan; and (3) any proposed changes to the Plan or IA reasonably necessary to effectuate the transfer and implement the ITP.

(b) Approval of Transfer by USFWS. USFWS may approve a proposed transfer of the ITP in whole or in part to a new party, which approval shall not be unreasonably withheld or delayed, provided that the USFWS field office responsible for administering the ITP determines that (1) the proposed transferee meets all of the qualifications to hold an ITP under 50 C.F.R. § 13.21; (2) the proposed transferee provides adequate written assurances that it will provide sufficient funding for the Plan, and that the proposed transferee will implement the terms and conditions of the ITP; and (3) the proposed transferee has provided such other information that the USFWS determines reasonably necessary to assess the transferee's ability to implement the ITP. No new conditions will be added to the Plan, ITP, or this IA if the proposed transferee meets these conditions for transfer.

17.4 Notice. Any notice permitted or required by this IA shall be in writing, delivered personally to the persons listed below, or shall be deemed to be given five (5) days after deposit in the United States mail, certified and postage prepaid, return receipt requested and addressed as follows, or at such other address as any Party may from time to time specify to the other Parties in writing. Notices may be delivered by facsimile or other electronic means, provided that they are also delivered personally or by certified mail, and such notices shall thereafter be deemed effective upon receipt.

BRE:	Vice President Beech Ridge Energy LLC One South Wacker Dr., Suite 1900 Chicago, Illinois 60606 Telephone: 312-224-1400 Fax: 312-224-1444
USFWS:	Regional Administrator U.S. Fish & Wildlife USFWS 300 Westgate Center Drive Hadley, MA 01035-9589 Telephone: (413) 253-8200 Fax: (413) 253-8308

17.5 Elected Officials not to Benefit. No member of or delegate to Congress shall be entitled to any share or part of this IA, or to any benefit that may arise from it.

17.6 Availability of Funds. Implementation of this IA by USFWS is subject to the requirements of the Anti Deficiency Act (31 U.S.C. § 1341) and the availability of appropriated funds. Nothing in this IA shall be construed by the Parties to require the obligation, appropriation or expenditure of any money from the U.S. Treasury. The Parties acknowledge that the USFWS shall not be required under this IA to expend any federal agency's appropriated funds unless and until an authorized official of that agency affirmatively acts to commit to such expenditures as evidenced in writing.

17.7 No Third Party Beneficiaries. Without limiting the applicability of rights granted to the public pursuant to the ESA or other federal law, this IA shall not create any right or interest in the public, or any member thereof, as a third party beneficiary hereof, nor shall it authorize anyone not a Party to this IA to maintain a suit for personal injuries or damages pursuant to the provisions of this IA. The duties, obligations, and responsibilities of the Parties to this IA with respect to third parties shall remain as imposed under existing law.

17.8 Relationship to the ESA and Other Authorities. The terms of this IA shall be governed by and construed in accordance with the ESA and applicable federal law. In particular, nothing in this IA is intended to limit the authority of USFWS to seek civil or criminal penalties or otherwise fulfill their responsibilities under the ESA. Moreover, nothing in this IA is intended to limit or diminish the legal obligations and responsibilities of the USFWS as an agency of the federal government. Nothing in this IA shall limit the right or obligation of any federal agency to engage in consultation required under Section 7 of the ESA or other federal law; however, it is intended that the rights and obligations of BRE under the Plan, ITP, and this IA shall be considered in any consultation concerning BRE's use of the Covered Lands.

17.9 References to Regulations. Any reference in this IA, the Plan or the ITP to any regulation or rule of the USFWS shall be deemed to be a reference to such regulation or rule in existence at the time an action is taken, except that BRE may rely on federal regulations in effect at the time this IA became effective to protect its rights under this IA.

17.10 Applicable Laws. All activities undertaken pursuant to this IA, the Plan or the ITP must be in compliance with all applicable state and federal laws and regulations.

17.11 Terms Do Not Run With the Land. The terms hereof are not intended to run with the land and will not bind the existing owners of Covered Lands or subsequent purchasers of the Project or Covered Lands unless such parties agree in writing to become bound by the Plan, ITP and this IA in accordance with Section 17.3 of this IA. Such parties that are not bound the ITP shall not benefit from USFWS' authorization of incidental take coverage or assurances.

17.12 Entire Agreement. This IA, together with the Plan and the ITP, constitute the entire agreement among the Parties. Excepting the Plan and ITP, the terms contained in this IA supersede any and all other agreements, either oral or in writing, among the Parties with respect to the subject matter hereof and contains all of the covenants and agreements among them with respect to said matters, and each Party acknowledges that no representation, inducement, promise or agreement, oral or otherwise, has been made by any other Party or anyone acting on behalf of any other Party that is not embodied herein.

17.13 Counterparts. This IA may be executed in counterparts. This IA shall become operative as soon as one counterpart has been executed by each Party. The counterparts so executed shall constitute one Agreement notwithstanding that the signatures of all Parties do not appear on the same page.

17.14 Authorized Parties. Each Party warrants that the signatory below is authorized to execute this Agreement on behalf of that Party.

IN WITNESS WHEREOF the Parties hereto have caused this IA to be executed as of the date of last signature below.

U.S. FISH AND WILDLIFE SERVICE

By ___________________________________

Its_________________________________

Date: _______________________________

BEECH RIDGE ENERGY LLC

By ___________________________________

Its_________________________________

Date: ________________________________

APPENDIX G

CULTURAL RESOURCES MEMORANDUM OF AGREEMENT, 67-TURBINE PHASE

MEMORANDUM OF AGREEMENT

Whereas, Beech Ridge Energy LLC (Beech Ridge) has determined that the proposed Beech Ridge Wind Energy Wholesale Electric Generating Facility and Related Transmission Support Line (Beech Ridge Wind Energy Facility), located in Greenbrier County may potentially have an effect on historic resources and;

Whereas after public notice and public hearings affording the public reasonable opportunity to participate in the review process, the West Virginia Public Service Commission (PSC) issued an order dated August 28, 2006 granting Beech Ridge Energy LLC a Siting Certificate to construct and operate the Beech Ridge Wind Energy Facility and;

Whereas the Certificate contains a condition that Beech Ridge shall receive all necessary agency approvals including that of the West Virginia Division of Culture and History - State Historic Preservation Office (WVSHPO) and;

Whereas Beech Ridge has consulted with the WVSHPO pursuant to 82 CSR 2 Standards and Procedures for Administering State Historic Preservation Programs implementing West Virginia Code 29-1-8(a) including identification of historic resources listed in or eligible for the National Register of Historic Places and assessment of possible effects to these resources and;

Whereas, Beech Ridge has conducted a survey of above ground historic resources located within the defined Area of Potential Effect and received concurrence from the WVSHPO regarding their eligibility according to the Criteria of Evaluation for listing in the National Register of Historic Places and;

Whereas, Beech Ridge has agreed to complete stipulations regarding the identification, evaluation of eligibility and assessment of effects regarding archaeological resources as elaborated below and;

Whereas, it is agreed that the potential adverse effects to above ground historic resources cannot be reasonably eliminated due to the nature of the Project and the necessary wind turbine height; and

Beech Ridge has identified and analyzed the potential alteration of the view shed and subsequent impact to the historic resources in the report entitled, "Assessment of Effects for the Proposed Beech Ridge Energy Facility," dated February 15, 2008, prepared by BHE Environmental, Inc., for the WVSHPO;

Now therefore, Beech Ridge and the WVSHPO agree that the following will be implemented to address the PSC Certificate condition and the potential effect of the Project on historic resources:

STIPULATIONS

A. Mitigation of Visual Effects to Above Ground Historic Resources

1. Beech Ridge will provide up to six copies of the completed survey, entitled "Architectural Investigations for the Proposed Beech Ridge Energy Facility," dated March 16, 2007, in hard-copy format and in electronic format on compact disk (CD) for deposit in the Greenbrier County Public Library, Greenbrier Historical Society (GHS), Williamsburg District Historical Foundation (WHF) in Greenbrier County, the Summersville and Richwood public libraries in Nicholas County, and the Nicholas County Historical & Genealogical Society.

2. Beech Ridge will provide one-time monetary funding of up to $10,000 or in-kind service of equivalent value for future assistance in historic preservation-related activities conducted for or by the WVSHPO and/or WHF that fall within the defined WVSHPO historic preservation program activities. Proposed activities shall focus upon the communities visually impacted by the Beech Ridge Energy Facility. This funding will be available at any time for a period of two years following notification by Beech Ridge to the WVSHPO of initiation of construction at the Beech Ridge site. An approved scope of work by the WVSHPO will be submitted to Beech Ridge.

3. Upon notification by WVSHPO, but no earlier than the initiation of construction of the Beech Ridge Wind Energy Facility, Beech Ridge shall provide said funding or in-kind services to WVSHPO and/or WHF for the approved historic preservation activities.

4. After fulfillment of the conditions described above or the expiration of the two year period following initiation of construction without a request from WVSHPO or WHF for funding, Beech Ridge

will have satisfied its mitigation requirements for this specific stipulation.

B. Identification and Mitigation Efforts for Archaeological Resources

1. Prior to the initiation of any construction activities that could potentially disturb or damage archaeological resources , Beech Ridge shall carry out archaeological investigations in accordance with WVSHPO *Guidelines for Phase I, II, and III Archeological Investigations and Technical Reports*, published in 2001 and in accordance with the methodology set forth in this Memorandum of Agreement. Beech Ridge shall ensure that all scopes of work for archaeological identification and evaluation include a plan for the treatment of human remains and funerary objects that might be encountered.

a) Phase I Archaeological Survey. Beech Ridge shall ensure that a Phase I Scope of Work will be developed in consultation with WVSHPO. Phase I work will be designed to provide information regarding the significance of all identified archaeological sites as "site is not eligible" or "eligibility of site is indeterminable" to the National Register of Historic Places (NRHP). This work will be done in consultation with WVSHPO and all deliverables will be submitted for WVSHPO review and comment.

 1) If Beech Ridge and the WVSHPO agree that a "site is not eligible" for the NRHP, then no further investigations of that site will be conducted.

 2) If Beech Ridge and the WVSHPO agree that a site with indeterminable eligibility can and will be avoided by the Beech Ridge Wind Energy Facility, which would be the preferred option, then no further investigation of that site will be conducted, unless avoidance no longer becomes feasible.

b) Phase II Archaeological Testing. If all parties agree that the "eligibility of a site is indeterminable" and avoidance is not feasible, Beech Ridge shall ensure that a Phase II Research Design will be developed in consultation with the WVSHPO. This document will be consistent with WVSHPO guidelines. Phase II work will be designed to provide information regarding the significance of an archaeological site as "site is not eligible" or "site is eligible" to the NRHP. This work will be done in consultation with WVSHPO and all deliverables will be submitted for WVSHPO review and comment.

1. If Beech Ridge and WVSHPO agree that a "site is not eligible" for the NRHP, then no further investigations of that site will be conducted.
2. If Beech Ridge and WVSHPO cannot agree regarding eligibility, all appropriate information regarding the site will be submitted by Beech Ridge to the Keeper of the National Register, National Park Service, for review. The Keeper's determination of eligibility will be final.
3. If Beech Ridge and WVSHPO agree that an eligible site can and will be avoided by the Beech Ridge Wind Energy Facility, which would be the preferred option, then no further investigation of that site will be conducted, unless avoidance no longer becomes feasible.

c) Application of Criteria of Adverse Effects. If parties agree that the "site is eligible" and avoidance is not a feasible alternative, then Beech Ridge will consult with WVSHPO to apply the criteria of adverse effects. This work will be completed in consultation with WVSHPO guidelines and all deliverables will be submitted for WVSHPO review and comment.

1. If following the application of the criteria of adverse effects, parties agree that the Beech Ridge Wind Energy Facility will have "no effect" or "no adverse effect" on an eligible site, then no further investigations of that site will be conducted.
2. If parties agree that the Beech Ridge Wind Energy Facility will have an "adverse effect" on an eligible site, but the project is subsequently redesigned to avoid adverse effects, then the finding would be changed to "no effect". Beech Ridge shall provide written documentation demonstrating avoidance for WVSHPO concurrence.
3. If continued design of the project determines that avoidance is no longer feasible, the effect will be reassessed.

d) Phase III Archaeological Data Recovery. If all parties agree that the Beech Ridge Wind Energy Facility will have an "adverse effect " on an eligible site and avoidance is not a feasible option, then Beech Ridge will consult with WVSHPO to identify measures to minimize and mitigate the adverse effect to the site. Beech Ridge shall ensure that a Data Recovery Plan will be developed in consultation with WVSHPO. The plan will be consistent with WVSHPO guidelines. The Phase III work will be designed to recover, interpret, and disseminate significant data for any eligible site. This work will be completed in consultation with WVSHPO guidelines and all deliverables will be submitted for WVSHPO review and comment.

1. Following WVSHPO review and approval of Phase III deliverables, no further investigations of that site will be conducted, unless an unanticipated post-review discovery is made.

e) Post-review discoveries.

In the event of any unanticipated discoveries of archaeological sites, unmarked cemeteries, or human remains and associated funerary objects during the implementation of the Beech Ridge Wind Energy Facility, all activities will be suspended in the area of discovery. Beech Ridge will contact WVSHPO within 48 hours of the discovery. In consultation with WVSHPO, Beech Ridge shall ensure that, if necessary, a qualified archaeologist will visit and assess the discovery within 72 hours of the initial WVSHPO notification. Through consultation, Beech Ridge and WVSHPO shall agree upon the appropriate treatment of the discovery prior to resumption of construction activities in the area of discovery. If human remains are determined to be of Native American origin, WVSHPO, in consultation with Beech Ridge, shall comply with W. Va. Code §29-1-8a. Beech Ridge affirms that all human remains will be avoided by direct construction impacts where feasible.

3. Dispute Resolution

During the execution of the stipulations as outlined above, should Beech Ridge and the WVSHPO be unable to reach a mutually satisfactory decision, except as noted, the WVSHPO will provide written comments to Beech Ridge. Beech Ridge shall respond to WVSHPO comments. This exchange of correspondence shall demonstrate that Beech Ridge has afforded the WVSHPO an opportunity to comment and considered potential effects to historic resources. All stipulations not subject to the dispute shall remain in force.

4. Reporting

Should there be an interruption of activity associated with the project for any significant length of time, Beech Ridge will provide at the minimum every six months a project status letter regarding the completion of work associated with the above stipulations.

5. Amendment

Beech Ridge and the WVSHPO may request an amendment to this agreement and consult with the other party prior to execution.

Execution of this Memorandum of Agreement by the Consulting Parties evidences that Beech Ridge has afforded the WVSHPO an opportunity to comment on the Project and its effects on historic properties and that Beech Ridge has addressed the Siting Certificate's condition of coordination with the WVSHPO in this regard.

MOA
Beech Ridge Wind Energy Wholesale Electric Generating
Facility and Related Transmission Support Line

CONSULTING PARTIES:

Susan M Pierce 7/31/08
West Virginia State Historic Preservation Office Date

David Groberg 8/4/08
Beech Ridge Energy LLC Date

1104590

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APPENDIX H

USFWS TEMPLATE LANGUAGE
TO BE INCLUDED IN EASEMENT AND FEE SIMPLE CONVEYANCES

USFWS TEMPLATE LANGUAGE
TO BE INCLUDED IN EASEMENT AND FEE SIMPLE CONVEYANCES

Real property deeds, transfers, and conservation easements take a variety of forms. To provide uniformity and consistency when implementing the Habitat Conservation Plan and Incidental Take Permit (HCP/ITP) mitigation requirements, this Template presents the legal text to be included when drafting those conveyances. Where indicated, there may be flexibility in terms of the language used or the content of a particular provision.

Listed first are the provisions common to all conveyances, regardless of the species being conserved. The Appendix is roughly ordered to reflect the organization and content of a standard conveyance: recitations, purpose, rights, interpretation and miscellaneous provisions. Restrictions on uses and reserved rights appear at the end, ordered by species.

RECITALS

These legal recitals must be included in any legal document conveying a real property interest over conservation lands. Due to the variations in state law, the type of conveyance that may be used, and preferences of the parties as to the format their documentation, wording of these recitations may need to change, but must be substantially similar in content. The parties are entitled to include other recitals that are not contradictory.

This _______ [insert type of real property conveyance] made this _______ day of _______ by and between _______ [name], a _______ [description of entity], Grantor, with an address of_______, and _______[name], a _______[description of entity], Grantee, with its headquarters_______, as follows:

WHEREAS, the Grantor, is the owner in ______ [describe ownership (e.g., fee simple)] of, or the current holder of a(n) [easement or lease, over, through and across, certain real property, hereinafter called the "Protected Property," which has ecological, scientific, educational and aesthetic value in its present state as a natural area which has not been subject to development or exploitation [or describe status with respect to development or exploitation] , which property is located in _______ and is more particularly described in Exhibit A, attached hereto and incorporated by this reference; and

[If applicable] WHEREAS, the Grantee, is a nonprofit corporation incorporated under the laws of [State, Commonwealth, or District] as a tax-exempt public charity under Section 501(c)(3) and/or 509(a)(1) of the Internal Revenue Code of 1986, as amended, and the regulations promulgated pursuant thereto (“IRC”), qualified under section 170(h) of the IRC to receive qualified conservation contributions, whose purpose is to preserve natural areas for scientific, charitable, educational and aesthetic purposes; and

WHEREAS, the Protected Property is a significant natural area which qualifies as a "...relatively natural habitat of fish, wildlife, or plants, or similar ecosystem," as that phrase is used in P.L. 96-541, 26 USC 170(h)(4)(A)(ii), as amended, and in regulations promulgated thereunder;

specifically the Protected Property is habitat for the _______ [ESA listed species for which mitigation is required]; and

WHEREAS, the Protected Property consists of _______ [general description of habitat]; and

WHEREAS, the Protected Property will protect and enhance _______[describe habitat values to be conserved], particularly as it relates to the [ESA listed species] with regard to _______ [discuss species needs and behaviors (e.g., breeding, feeding, sheltering, migration, etc.] The Protected Property's_______ [describe habitat values], provides [or will provide] suitable ______ habitat for the_______ [ESA listed species] ; and

WHEREAS, the United States Fish and Wildlife Service (the "USFWS") within the United States Department of the Interior, is authorized by federal law to administer the federal Endangered Species Act (hereinafter "ESA"), 16 U.S.C. § 1531 et seq., and other laws and regulations; and

WHEREAS, the _______ [ESA listed species] has been listed as _______ [insert species listing status; e.g., endangered or threatened] by the USFWS under the ESA; and

WHEREAS, ______ applied to the USFWS for the issuance of an Incidental Take Permit (the "ITP"), submitted a Habitat Conservation Plan ("HCP") pursuant to ESA Section 10 regarding its ______________, and was issued an ITP on _______ [insert date], respectively; and

WHEREAS, as conditioned by the ITP, ______ is required to mitigate for take of ESA listed species, including _______ [species to be conserved through this conveyance] and agreed to acquire and permanently preserve certain real property interests in a manner and amount consistent with the terms of its HCP, in order to conserve the wildlife habitat features of the Conservation Area in their natural condition; and

WHEREAS, the specific conservation values of the Protected Property are documented in an Easement Documentation Report, prepared by _______ [insert name of entity preparing report] and signed and acknowledged by the Grantor, establishing the baseline condition of the Protected Property at the time of this grant and including reports, maps, photographs, and other documentation; and

WHEREAS, the Grantor and Grantee have the common purpose of conserving the above-described conservation values of the Protected Property in perpetuity; and

[If through a conservation easement] WHEREAS, the State [or Commonwealth] of _______has authorized the creation of Conservation Easements pursuant to _______ [insert citation to state law] and Grantor and Grantee wish to avail themselves of the provisions of that law;

NOW, THEREFORE, the Grantor, for and in consideration of the facts above recited and of the mutual covenants, terms, conditions and restrictions herein contained and as an absolute and unconditional gift [or consideration of $1], does hereby give, grant, bargain, sell and convey unto the Grantee, a _______ [insert type of conveyance] in perpetuity over the Protected Property of the nature and character and to the extent hereinafter set forth.

The following provisions below should be incorporated in their entirety. Any deviation must be both substantially similar and approved by U.S. Fish and Wildlife USFWS, in consultation with its Solicitor, prior to execution and recording.

PURPOSE

Purpose. It is the primary purpose of this _______ [insert type of conveyance] to assure that the Protected Property will be retained forever in its _______[insert type of habitat] as suitable for the_______ [insert ESA listed species], irrespective of the federal listing status of the species; *[optional, depending on Grantee's interest: and also to the extent consistent with the primary purpose, to protect any other rare plants, animals, or plant communities on the Protected Property, and to ensure the Protected Property remains permanently in a natural, scenic and _____ [describe habitat , e.g., forested, etc.] condition*; and to prevent any use of the Protected Property that will significantly impair or interfere with the conservation values or interests of the Protected Property described above. Grantor intends that this _______ [insert type of conveyance] will confine the use of the Protected Property to such activities as are consistent with the purpose of this _______ [insert type of conveyance].

U.S. FISH AND WILDLIFE SERVICE THIRD-PARTY BENEFICIARY RIGHTS

The U.S. Fish and Wildlife USFWS as Third-Party Beneficiary; Enforcement and Remedies.

X.1. The parties hereto agree that, because of the USFWS's duties and powers arising under the ESA and consistent with's commitments to its HCP and ITP, the USFWS has a clear and substantive interest in the preservation and enforcement of this_______ [type of conveyance]. Therefore, the parties grant to the USFWS, its agents, successors and assigns, the rights and standing to be noticed, to enter the Property, to approve or disapprove requests, and to enforce this _______ [type of conveyance] as described in this section and according to its terms.

X.2. Grantor shall notify the USFWS in writing of the names and addresses of any party to whom the Protected Property, or any part thereof, is to be granted, conveyed or otherwise transferred at or prior to the time said transfer is consummated.

X.3. This _______ [type of conveyance] does not convey a general right of access to the public, except that the USFWS, its agents, contractors, and assigns, may enter onto the Protected Property at any time upon 24 hours notice to Grantor for the purpose of conducting inspections to determine compliance with the terms contained herein, for the purpose of assessing the _______ [ESA listed species] population status and vegetative habitat suitability, in accordance with the terms of the ITP, HCP and the ESA implementing regulations at 50 C.F.R. Parts 13, Subparts C and D, or for the purposes of conducting _______ [specific management or monitoring activities] in accordance with the terms of the HCP.

X.4. In addition to any other rights and remedies available to the USFWS at law or in equity, the USFWS shall have the right, but not the obligation to enforce this **_______** [type of conveyance] and is entitled to exercise the same remedies available to Grantee, identified in paragraph **_______** [paragraph in that lists Grantee enforcement rights]. The USFWS may do so upon the written request of Grantee or if Grantee fails to enforce the**_______** [type of conveyance]. Prior to taking any enforcement action, the USFWS shall notify Grantee in writing of its intention and shall afford Grantee a reasonable opportunity to negotiate a remedial action and settlement with Grantor or commence its own an enforcement action. No failure on the part of the USFWS to enforce any term, condition, or provision hereof shall discharge or invalidate such term, condition, or provision to affect its right or that of Grantee or Grantor to enforce the same.

OTHER MANDATORY PROVISIONS

Assignment. The parties hereto recognize and agree that the benefits of this **_______**[type of conveyance] are in gross and assignable, and the Grantee hereby covenants and agrees that in the event it transfers or assigns **_______** [property interest], it shall obtain written concurrence of the USFWS, and the organization receiving the interest will be a qualified organization as that term is defined in Section 170(h)(3) of the IRC (or any successor section) and the regulations promulgated thereunder, which is organized and operated primarily for one of the conservation purposes specified in Section 170(h)(4)(A) of the IRS, and Grantee further covenants and agrees that the terms of the transfer or assignment will be such that the transferee or assignee will be required to continue to carry out in perpetuity the conservation purposes which the contribution was originally intended to advance.

Subsequent Transfers. The Grantor agrees that the terms, conditions, restrictions and purposes of this grant or reference thereto will be inserted by Grantor in any subsequent deed or other legal instrument by which the Grantor divests any retained, reserved or reversionary interest and by Grantee if Grantee subsequently transfers any fee simple title or possessory interest in the Protected Property; and Grantor and Grantee further agree to notify Grantee or Grantor, as appropriate, and the USFWS of any pending transfer at least thirty (30) days in advance.

Government Permits and Approvals. The conveyance of this **_______** [type of conveyance] by the Grantor to the Grantee does not replace, abrogate, or otherwise set aside any local, state or federal laws, requirements or restrictions applicable to the Property or Conservation Area and shall not relieve Grantor of the obligation and responsibilities to obtain any and all applicable federal, state, and local governmental permits and approvals, if necessary, to exercise Grantor's retained rights and uses of the Protected Property even if consistent with the conservation purposes of this**_______** [type of conveyance].

Eminent Domain. Whenever all or part of the Protected Property is taken in exercise of eminent domain by public, corporate, or other authority so as to abrogate the restrictions imposed by this**_______** [type of conveyance], the Grantor and the Grantee shall join in appropriate actions at the time of such taking to recover the full value of the taking and all incidental or direct damages resulting from the taking, which proceeds shall be divided**_______** [insert method], and **_______** [discuss how proceeds will be spent]. All expenses incurred by the Grantor and the Grantee in such action shall be paid out of the recovered proceeds

Interpretation. This **_______** [type of conveyance] shall be interpreted and performed pursuant to the laws of the State in which it is recorded, the federal Endangered Species Act, and other applicable federal laws.

Severability. If any provision in this instrument is found to be ambiguous, an interpretation consistent with the purposes of this **_______** [type of conveyance] that would render the provision valid shall be favored over any interpretation that would render it invalid. If any provision of this **_______** [type of conveyance] or the application thereof to any person or circumstance is found to be invalid, the remainder of the provisions of this **_______** [type of conveyance] and the application of such provisions to persons or circumstances other than those as to which it is found to be invalid shall not be affected thereby.

Successors and Assigns. The term "Grantor" shall include the Grantor and the Grantor's successors and assigns and shall also mean the masculine, feminine, corporate, singular or plural form of the word as needed in the context of its use. The term "Grantee" shall include **_______** and its successors and assigns.

Notices. Any notices, consents, approvals or other communications required in this **_______** [type of conveyance] shall be sent by registered or certified mail to the appropriate party or its successor in interest at the following address or such address as may be hereafter specified by notice in writing:

Grantor:
Grantee:
USFWS:
[Others:]

Counterparts. The parties may execute this instrument in two or more counterparts, which shall, in the aggregate, be signed by both parties; each counterpart shall be deemed an original instrument as against any party who has signed it. In the event of any disparity between the counterparts produced, the recorded counterpart shall be controlling.

Captions. The captions herein have been inserted solely for convenience of reference and are not a part of this **_______** [type of conveyance] and shall have no effect upon construction or interpretation.

Additionally, each conveyance must include provisions to address the following topics. The contents of these provisions must be negotiated by the parties. They may therefore differ considerably depending on the property, values to be conserved, and the intensity of management and monitoring required. There is no prescribed template for the following provisions. But the USFWS has recommended language it can provide the parties if desired:

Monitoring and Management;
Endowment [if applicable];
Cost and Liabilities;

Taxes;
Title;
Standing;
Extinguishment;
Merger;
Parties subject to the conveyance; and,
Grantee Rights of Entry and Enforcement [which must include, at a minimum, the right to: 1) prevent any activity on or use of the Protected Property that is inconsistent with the purpose of the conveyance and to require the restoration of such areas or features of the Protected Property that may be damaged by any inconsistent activity or use; 2) bring an action at law or equity in a court of competent jurisdiction to enforce the terms of the conveyance; 3) to require the restoration of the Protected Property to its previous condition; 4) to enjoin such non-compliance by ex parte temporary or permanent injunction in a court of competent jurisdiction; and/or, 5) to recover any damages arising from such noncompliance.]

Also, each conveyance *must* include the following text regarding force majeure. This text may be revised only to reflect any binding contingencies for adaptive management and changed circumstances, if any, memorialized in the HCP or ITP. But any changes must first be reviewed and approved by the USFWS in consultation with its Solicitor.

X. Neither absence of [ESA listed species] from the Conservation Area nor a loss of or significant injury to conservation values for the ________ [ESA listed species] due to circumstances including, but without limitation, fire, flood, storm, disease, or seismic events, shall be construed to render the purpose of this Conservation Easement impossible to accomplish and shall not terminate or extinguish this Conservation Easement in whole or in part. In the case of loss of or significant injury to any of the conservation values for the [ESA-listed species] due to fire, flood, storm, disease, seismic events or similar circumstances, the Grantor or Grantee may, but shall not be required to, seek to undertake measures in consultation with the USFWS to restore such conservation values, subject to the terms of the HCP/ITP.

INDIANA BAT (SUMMER/SWARMING HABITAT) USE RESTRICTIONS AND RESERVED RIGHTS[36]

RESTRICTIONS

General Description	Legal Description to be included in Conveyance
No Industrial Use	No industrial activities, including but not limited to the construction or placement of buildings or parking areas, shall occur on the Protected Property
No New Residential Use	No new residential structures or appurtenances, including but not limited to the construction or placement of new homes, mobile homes or storage sheds, shall be constructed on the Protected Property.
No Commercial Use	No commercial activities shall occur on the Protected Property, except for the low impact recreational uses explicitly identified under Reserved Rights.
No Agricultural Use	No new agricultural activities that were not previously documented as part of the baseline conditions shall occur on the Protected Property, including the use of the Protected Property for cropland, waste lagoons, detention or collection ponds, or pastureland.
No Vegetative Clearing	No forestry or timbering activities shall occur on the Protected Property, except that 1) Grantee maintains the right to conduct silvicultural modifications with the intent to improve listed species habitat within the Protected Property through reforestation, afforestation or silvicultural management to improve the health of the Indiana bat habitat; and 2) limited vegetative clearing may occur as described under Reserved Rights only.
Development Rights Extinguished	No development rights which have been encumbered or extinguished by this Conservation Easement shall be transferred pursuant to a transferable development rights scheme or cluster development arrangement or otherwise.
No Subdivision	The Protected Property may not be divided or subdivided. Further, the Protected Property may not be divided, partitioned, or nor conveyed except in its current configuration as an entity.

[36] USFWS acknowledges that there may be limited or extenuating circumstances that may warrant a deviation from this required boilerplate. The nature of the restrictions and consideration of allowable uses will necessarily depend on the land to be protected. Grantors or Grantees who wish to alter the language of these provisions bear the burden of demonstrating to the satisfaction of BRE and USFWS that doing so would not diminish or interfere with the conservation of Indiana bats and their habitat. Any such change(s) must be approved by USFWS in writing, after consulting with agency counsel, and prior to execution of the conveyancing document.

No Utilities (except for existing encumbrances)[37]	No new utilities, including pipes, pipelines, transmission lines, whether aboveground or underground, shall be constructed or installed on the Protected Property.
No New Construction	There shall be no new building, facility, mobile home, or other Structure, temporary or permanent, constructed or placed on the Protected Property, except as deemed necessary to construct artificial roosting habitat for Indiana bats.
No Littering or Dumping	No dumping of soil, trash, ashes, sawdust, garbage, waste, abandoned vehicles, appliances or machinery, dredge spoil, or other material shall occur on the Protected Property.
No Burning of Waste	No burning of trash or waste shall occur on the Protected Property.
No Disposal of Hazardous Waste	No dumping, disposal, or storage of hazardous materials shall occur on the Protected Property, including but not limited to used motor oil, household chemicals, insecticides, herbicides, or similar chemicals, or of containers of such materials, except to the extent such materials or containers are used for the purposes of managing the conservation values of the Protected Property and are securely stored and/or maintained.
No Grading, Mineral Use, Excavation, Dredging	No grading, excavation, dredging, mining, or drilling and no removal of topsoil, sand, gravel, rock, peat, minerals, or other material shall occur on the Protected Property except to the extent that such activities are consistent with other Reserved Rights.
Placement of Spoils	No filling or placement of dredged spoil, topsoil, or other materials shall occur in or near [specify waterbody, if any] or on Protected Property shall occur, except as necessary for stream bank restoration or protection measures approved by the USFWS through its ITP, and which is consistent with local, state and federal law.
Limited Signage	No signs shall be permitted on the Protected Property except interpretive signs describing restoration activities and the Conservation Values of the Conservation Area; signs along hiking, biking or cross-country skiing trails *[if uses are reserved]*; signs identifying the owner of the Protected Property and the holder of this Conservation Easement; any signage required by applicable federal, state or local laws; and signs giving directions or prescribing rules and regulations for the use of the Protected Property.
No Fencing	No fences shall be erected on the Protected Property, except to exclude livestock from certain areas, to the extent that such an agricultural use was in existence at the time the baseline was determined, or is necessary

[37] Through the HCP, the ITP and IA, the USFWS reserves the right to review proposed mitigation prior to approval. Doing so will require the project proponent to identify existing encumbrances (e.g., mineral estates, rights-of-way, utilities, etc) that could interfere with the conservation value of the proposal.

as a habitat management tool elsewhere on the Protected Property.

Pesticide, Herbicide Prohibitions

No rodenticides or other small mammal control measures that may adversely affect the purpose of this Conservation Easement shall be used or undertaken on the Protected Property. No pesticides or fertilizers will be used on the Protected Property, except in those instances when the conservation values of the Protected Property are threatened to the extent that the conservation values may be extirpated or lost without aggressive management and stewardship activities being implemented. The Grantee, on consultation with the Grantor, and with the written concurrence of the USFWS, may use pesticides when conservation values may be so affected.

Prohibitions on mechanized vehicles/equipment

No off-road, all-terrain or similar vehicles are permitted to operate on the Protected Property, except for emergency vehicles or where necessary to effectuate the terms of this Conservation Easement. Use of mechanized vehicles shall only be allowed for the construction and maintenance of artificial roosts for Indiana bats, planting vegetation, moving rocks, soil, and trail maintenance.

RESERVED RIGHTS

Recreational Use

No recreational activities shall occur in the Conservation Area, except for low-impact recreational activities, including but not limited to, hunting/fishing, walking, jogging, biking, cross-country skiing, snowshoeing, wildlife observation, photography, horseback riding, and use of interpretive trails, so long as these activities:

1) are consistent with the Purpose of this _______[type of conveyance]t; and,

2) do not result in the destruction of, or harm the viability of, trees or other vegetation in the Protected Property, except that the limited clearing or cutting of vegetation is permissible in accordance with the limitations below.

In constructing trails, the Grantor shall avoid clearing trees greater than five (5) inches in diameter at breast height (dbh). To the extent that it is necessary to install a crossing of a wet seep or stream deemed to be in need of protection by the Grantee, such wet seep or stream will be protected by using appropriate structures, such as boardwalks, as approved by the Grantee, and installed at the expense of the Grantor.

Educational Use

The Grantor reserves the right to conduct educational activities within the Protected Property, such as site visits, studies and observations. Any educational activities involving attempts to capture Indiana bats or activities that could otherwise result in the take of Indiana bats, as that term is defined by the ESA, may be undertaken only in accordance with applicable federal and state laws.

Vegetative Management

No cutting, removing, mowing, destroying, harming, harvesting, pruning, planting or relocating of trees, shrubs, or other vegetation shall occur in the Protected Property except that the removal of vegetation is authorized in connection with:

1) The construction and maintenance of trails for low impact recreational activities as identified as a Reserved Right, provided that such trails shall be no more than eight (*8)* feet wide and shall be vegetated or covered with grasses and/or gravel. All vegetative clearing in connection with trail construction shall occur between November 15 and March 31. No trees that are greater than five (*5)*inches dbh shall be removed in the course of developing such trails;

2) The removal of any trees that present a safety hazard. If removal of any potential roost trees is required between April 1 and November 14, Grantor, with the guidance of a USFWS or appropriate state wildlife agency or other qualified biologist must determine whether the tree is being used as a roost tree by Indiana bats and must contact the USFWS to coordinate prior to tree removal. If Grantor has a reasonable, objective

basis to believe that a tree that provides Indiana bat roosts poses an Imminent Hazard (i.e., must be cut down immediately in order to avoid significant injury that will be realized prior to completing consultation with a qualified biologist, the USFWS or State wildlife agency according to the above terms), Grantor may cut such tree, provided that the Grantor shall allow a qualified biologist to examine any such tree immediately after the tree is cut down and before it is removed from the area to determine whether the tree is occupied by the Indiana bat or to allow the USFWS or state wildlife agency to determine how to handle any Indiana bats occupying or displaced from the tree; or

3) Restoration or management of the Protected Area as identified in a USFWS-approved management plan that is consistent with the ITP and HCP.

Restoration and Maintenance Of Conservation Values

Any restoration and maintenance activities must be deemed suitable and necessary by the Grantee and the USFWS to maintain or improve the conservation values of the Protected Property, and shall not diminish the mitigation ratios, quality or quantity specified in___________'s ITP and accompanying HCP. Any restoration activities to be conducted by the Grantor must be proposed in writing to the Grantee, or by Grantee as part of a USFWS-approved management plan, consistent with the ITP and HCP.

INDIANA BAT (HIBERNACULA) USE RESTRICTIONS AND RESERVED RIGHTS[38]

RESTRICTIONS

General Description	Legal Description to be included in Conveyance
No Industrial Use	No industrial activities, including but not limited to the construction or placement of buildings or parking areas, shall occur on the Protected Property
No New Residential Use	No new residential structures or appurtenances, including but not limited to the construction or placement of new homes, mobile homes or storage sheds, shall be constructed on the Protected Property.
No Commercial Use	No commercial activities shall occur on the Protected Property except for the recreational uses explicitly identified under Reserved Rights.
No Agricultural Use	No agricultural activities shall occur on the Protected Property, including the use of the Protected Property for cropland, waste lagoons, detention or collection ponds, or pastureland.
No Vegetative Clearing	No forestry or timbering activities shall occur on the Protected Property, except that 1) Grantee maintains the right to conduct silvicultural modifications with the intent to improve listed species habitat within the Protected Property through reforestation, afforestation or silvicultural management to improve the health of the Indiana bat habitat; and 2) limited vegetative clearing may occur as described for reserved uses only.
Development Rights Extinguished	No development rights which have been encumbered or extinguished by this Conservation Easement shall be transferred pursuant to a transferable development rights scheme or cluster development arrangement or otherwise.
No Subdivision	The Protected Property may not be divided or subdivided. Further, the Protected Property may not be divided, partitioned, or nor conveyed except in its current configuration as an entity.

[38] USFWS acknowledges that there may be limited or extenuating circumstances that may warrant a deviation from this required boilerplate. The nature of the restrictions and consideration of allowable uses will necessarily depend on the land to be protected. Grantors or Grantees who wish to alter the language of these provisions bear the burden of demonstrating to the satisfaction of BRE and USFWS that doing so would not diminish or interfere with the conservation of Indiana bats and their habitat. Any such change(s) must be approved by USFWS in writing, after consulting with agency counsel, and prior to execution of the conveyancing document.

No Utilities (except for existing encumbrances)[39]	No new utilities, including pipes, pipelines, transmission lines, whether aboveground or underground, shall be constructed or installed on the Protected Property.
No New Construction	There shall be no new building, facility, mobile home, or other Structure, temporary or permanent, constructed or placed on the Protected Property, except as deemed necessary to construct artificial tree roosting habitat for Indiana bats.
No Littering or Dumping	No dumping of soil, trash, ashes, sawdust, garbage, waste, abandoned vehicles, appliances or machinery, dredge spoil, or other material shall occur on the Protected Property.
No Burning of Waste or Open Fires	No burning of trash or waste, or building of open-air fires including, fires for cooking purposes and campfires shall occur on the Protected Property.
No Disposal of Hazardous Waste	No dumping, disposal, or storage of hazardous materials shall occur on the Protected Property, including but not limited to used motor oil, household chemicals, insecticides, herbicides, or similar chemicals, or of containers of such materials, except to the extent such materials or containers are used for the purposes of managing the conservation values of the Protected Property and are securely stored and/or maintained.
No Grading, Mineral Use, Excavation, Dredging	No grading, excavation, dredging, mining, or drilling and no removal of topsoil, sand, gravel, rock, peat, minerals, or other material shall occur on the Protected Property except to the extent that such activities are consistent with other reserved rights (e.g., managing Protected Property for Indiana bats).
Placement of Spoils	No filling or placement of dredged spoil, topsoil, or other materials in or within 100 feet of hibernacula entrance and associated sinkholes, fissures, or other karst features on Protected Property shall occur, except as protection measures approved by the USFWS through its ITP, and which is consistent with local, state and federal law. A greater distance will be required if results of Adaptive Management under section 10 of the HCP reveals that 100 feet is not sufficiently protective of Indiana bats.
Limited Signage	No signs shall be permitted on the Protected Property except interpretive signs describing restoration activities and the Conservation Values of the Conservation Area; signs along hiking, biking or cross-country skiing trails for Reserved Rights; signs identifying the owner of the Protected Property and the holder of this Conservation Easement; any signage required by applicable federal, state or local laws; and signs giving directions or prescribing rules and regulations for the use of the Protected Property.

[39] Through the HCP, the ITP and IA, the USFWS reserves the right to review proposed mitigation prior to approval. Doing so will require the project proponent to identify existing encumbrances (e.g., mineral estates, rights-of-way, utilities, etc) that could interfere with the conservation value of the proposal.

No Fencing	No fences shall be erected on the Protected Property, except to exclude access to hibernacula entrances if the hibernacula is not gated.
No pets	No pets will be allowed within the hibernacula on the Protected Property.
Prohibitions on mechanized vehicles/equipment (tailored to species/purpose)	No off-road, all-terrain or similar vehicles are permitted to operate on the Protected Property, except for emergency vehicles or where necessary to effectuate the terms of this Conservation Easement. Use of mechanized vehicles shall be allowed only for the construction and maintenance of artificial roosts for Indiana bats, planting vegetation, moving rocks, soil, and trail maintenance.

RESERVED RIGHTS

Recreational Use

No recreational activities shall occur in the Conservation Area, except for low-impact recreational activities, including but not limited to, hunting/fishing, walking, jogging, biking, cross-country skiing, snowshoeing, wildlife observation, photography, horseback riding, and use of interpretive trails, so long as these activities:

1) are consistent with the Purpose of this _______[type of conveyance]; and,

2) do not result in the destruction of, or harm the viability of, trees or other vegetation in the Protected Property, except that the limited clearing or cutting of vegetation is permissible in accordance with the limitations below.3) do not include the entry of protected hibernacula. In constructing trails, the Grantor shall avoid clearing trees greater than five(5) inches in diameter at breast height (dbh) and construction within 100 feet of hibernacula entrances and associated sinkholes, fissures, or other karst features.

To the extent that it is necessary to install a crossing of a wet seep or stream deemed to be in need of protection by the Grantee, such wet seep or stream will be protected by using appropriate structures, such as boardwalks, as approved by the Grantee, and installed at the expense of the Grantor.

Educational Use

The Grantor reserves the right to conduct educational activities within the Protected Property, such as site visits, studies and observations. Any educational activities involving attempts to view and capture Indiana bats or activities that could otherwise result in the take of Indiana bats, as that term is defined by the ESA, may be undertaken only in accordance with applicable federal and state laws.

Vegetative Management

No cutting, removing, mowing, destroying, harming, harvesting, pruning, planting or relocating of trees, shrubs, or other vegetation shall occur in the Protected Property except that the removal of vegetation is authorized in connection with:

1) The construction and maintenance of trails for low impact recreational activities as identified as a Reserved Right, provided that such trails shall be no more than eight (*8)* feet wide and shall be vegetated or covered with grasses and/or gravel. All vegetative clearing in connection with trail construction shall occur between November 15 and March 31. No trees that are greater than five (*5)*inches dbh shall be removed in the course of developing such trails;

2) The removal of any trees that present a safety hazard. If removal of any potential roost trees is required between April 1 and November 14, Grantor, with the guidance of a USFWS or appropriate state wildlife

agency or other qualified biologist must determine whether the tree is being used as a roost tree by Indiana bats and must contact the USFWS to coordinate prior to tree removal. If Grantor has a reasonable, objective basis to believe that a tree that provides Indiana bat roosts poses an Imminent Hazard (i.e., must be cut down immediately in order to avoid significant injury that will be realized prior to completing consultation with a qualified biologist, the USFWS or State wildlife agency according to the above terms), Grantor may cut such tree, provided that the Grantor shall allow a qualified biologist to examine any such tree immediately after the tree is cut down and before it is removed from the area to determine whether the tree is occupied by the Indiana bat or to allow the USFWS or state wildlife agency to determine how to handle any Indiana bats occupying or displaced from the tree.

Maintenance Of Conservation Values

Any restoration and maintenance activities must be deemed suitable and necessary by the Grantee and the USFWS to maintain or improve the conservation values of the Protected Property, and shall not diminish the mitigation ratios, quality or quantity specified in_______'s ITP and accompanying HCP. Any restoration activities to be conducted by the Grantor must be proposed in writing to the Grantee, or by Grantee as part of a USFWS-approved management plan, consistent with the ITP and HCP.